

SOUTHERN POWER AND INDUSTRY

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APRIL, 1951

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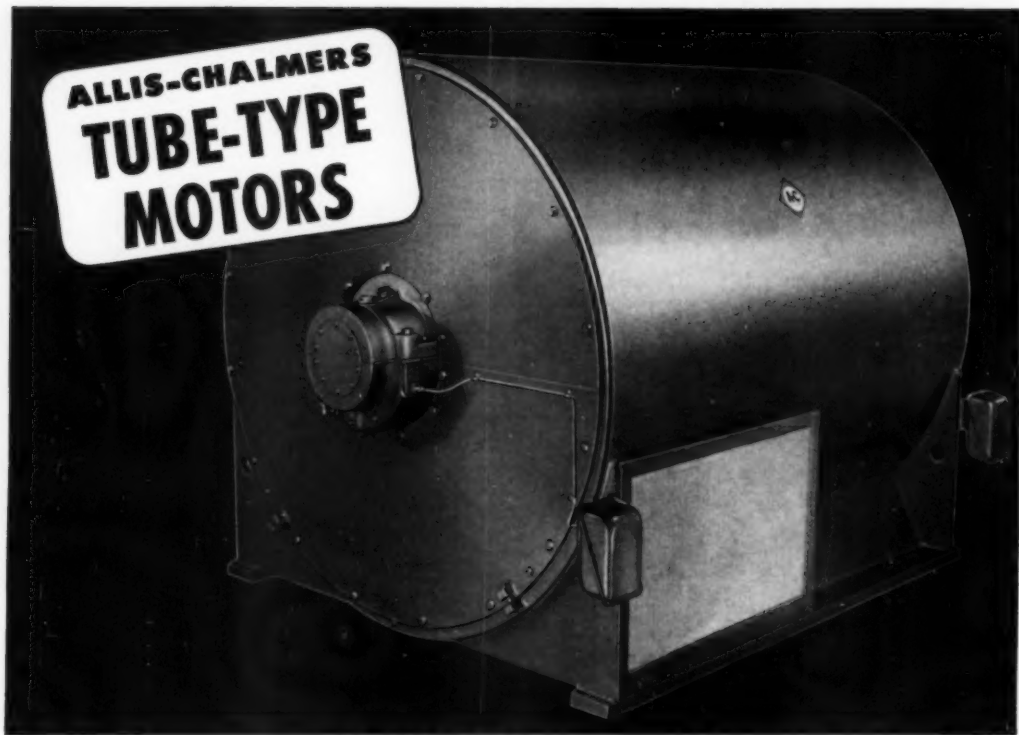
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Volume 69

Number 4

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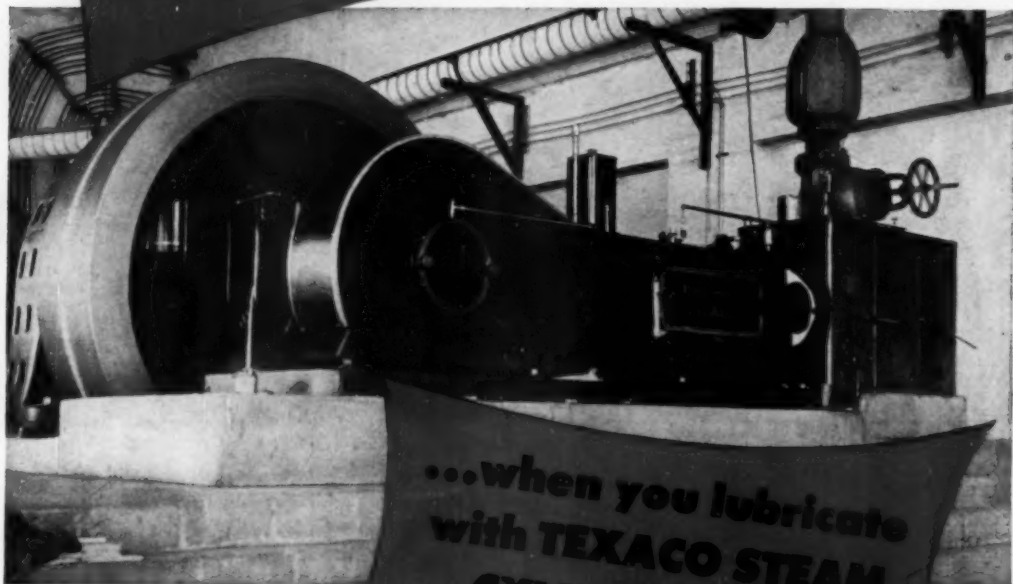
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SOUTHERN POWER & INDUSTRY for APRIL, 1951

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SOUTHERN POWER AND INDUSTRY

APRIL
1951



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Only one moving part



So simple—because trouble making parts have been reduced to a minimum. No pins, no pivots, no bearings, no linkages to corrode and stick.

2

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So trouble free—because the double break, silver alloy contacts never need filing, cleaning, or dressing. Install Allen-Bradley starters—and forget them.

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Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

April, 1951

REYNOLDS' TEXAS ALUMINUM PLANT, when completed in late 1951, will have to draw its alumina from Reynolds' Hurricane Creek, Arkansas operation. However, additional integration plans for the new plant at Corpus Christi call for a 1,000 ton per day alumina unit. Aluminum is made from alumina which is made from bauxite. The latter will come from extensive reserves in Jamaica. A seven mile ship channel is also being constructed to link the plant with the intercoastal canal.

The \$80 million Texas operation will have the capacity to produce 150,000,000 lb of aluminum pig annually. 175,000 kw of power will be generated by internal combustion engines, energized by natural gas. The aluminum reduction facility will be housed in four pot line buildings each of 1,600 ft long. Reynolds Metals Company is the second largest producer of aluminum in the United States.

FIRST PRODUCTION OF ALUMINUM PIG in the latter part of this year and operation of all four reduction lines by the middle of next year is the schedule for KAISER ALUMINUM & CHEMICAL CORPORATION's \$79 million aluminum reduction plant at NEW ORLEANS, LOUISIANA. Construction is being rushed on the 200,000,000 lb per year plant and power facilities. United Gas Pipeline Company will supply natural gas from the vast Gulf area fields in amounts up to 70 million cu ft a day.

Kaiser's bauxite plant at Baton Rouge, Louisiana will be expanded and modified to handle the new source of bauxite ore in Jamaica and to increase from 300,000 tons a year to 540,000 tons the production of alumina. Kaiser Aluminum's reduction plants at Spokane, Washington and at New Orleans will be respectively the second and third largest primary aluminum plants in the United States and the third and fourth largest in the world.

LONE STAR STEEL'S \$73 million expansion program at LONGVIEW, TEXAS was featured in the March issue of SP&I. Company is supplementing its blast furnace, coke ovens, and by-products facility with four open-hearth furnaces, soaking pits, rolling mill and finishing department for production of welded steel pipe for the oil industry. Construction is now under way with Brown & Root of Houston handling general contracting and over-all supervision; American Bridge Company fabrication of major buildings and Morgan Engineering heavy-duty cranes. David C. Pfeiffer, Dallas, Texas consulting engineer is designing and will supervise construction of the new \$1,250,000 power plant.

ST. LOUIS, MISSOURI will be the world's largest producer of magnesium metal products upon completion of the new DOW CHEMICAL plant. Industrial development in this city hit a new high in January with 3 new industries and expansion of 18 local operations calling for an added investment of more than \$100 million. The 3 new industries—DOW CHEMICAL, LEVER BROS. producing detergents, shortening, margarine, etc., and the PUREX CORPORATION also to produce detergents.

INDUSTRIAL EXPANSION TRENDS—Construction underway by Lummus Co. of GULF OIL'S ethylene plant at PORT ARTHUR, TEXAS. Utilizing by-product gases from refining process, plant will be world's largest single unit for making ethylene...DIXIE CUP COMPANY spending \$1,500,000 doubling capacity of FORT SMITH, ARKANSAS plant...Ford, Bacon & Davis building COLUMBIUM CARBON COMPANY'S new \$1,500,000 carbon-black plant

near ELDORADO, ARKANSAS refinery of PanAm Southern Corporation. New \$1 million electrical distribution equipment manufacturing plant of the LINE MATERIAL COMPANY of Milwaukee, Wisc., now under construction at SHERMAN, TEXAS...JOHNSON & JOHNSON, manufacturers of surgical dressings, etc., has taken 8 year lease on the Texas Textile Mills plant at DALLAS, TEXAS. Manufacturing operations in latter plant moved to WACO and MCKINNEY, TEXAS plants...ROCKWELL MANUFACTURING CO of Pittsburgh to construct 150,000 sq ft manufacturing plant at TUPELO, MISSISSIPPI . . . VANADIUM CORP OF AMERICA is contemplating new \$7 million plant at NEW HAVEN, WEST VIRGINIA for production of silicon alloys.

LONGVIEW, TEXAS' Julius D. Madaras, President of the Madaras Corporation and Southwestern Metals, Inc., has developed a new steel making process, which utilizes natural gas or fuel oil as a reducing agent in place of the conventional coke. In the oxygen removal process, hydrogen gas is repeatedly injected and exhausted into iron ore, heated to about 2,000 F. The inventor claims that a ton of steel can be produced for about \$30.

On the basis of past experience in this field, there is naturally considerable skepticism on the part of other metallurgical engineers. There are considerable difficulties, both technical and economic, connected with a process of this kind. However, Madaras produced sponge iron has been used by Southwestern consumers for some time and has been found highly satisfactory. The Longview plant, now under expansion, can produce 10,000 tons of electric steel ingots each month

NEW APPLICATION FOR STEAM TURBINES—The Transcontinental Gas Pipe Line Corp's new Houston to New York pipeline will use turbine driven high pressure centrifugal compressors in three of its booster stations. This is a radical departure from the standard practice of using reciprocating gas-engine driven units or motor driven centrifugals for high pressure natural gas transmission. First of these new compressors to go into service will be the three De Laval units driven by 5,000 hp condensing turbines. Complete installation for each station will also include 2—800 kw De Laval geared turbine generators for station power.

NEW "TWISTITE" VALVE, consisting of two sections of flexible rubber tubing, joined by a rotating collar and completely dust-tight in either opened or closed position, is designed to handle lump and fine materials. Closure is obtained by pulling on a cable wrapped around the rotating collar, sealing the opening with a twist in each of the rubber sleeves. The STEPHENS-ADAMSON development permits several convenient arrangements for operation—hand or motor operation, local or remote control. Device is illustrated in the New Equipment section of this issue.

SEPARATOR DETERIORATION due to oxidation is one of the major causes of battery failures. Separators are inserted between the plates of a battery to separate the positive from the negative plates. Port Orford Cedar or Douglas Fir wood is commonly used and in the higher grade batteries rubber or glass, because of their better resistance to electrolyte attack and oxidation.

The Electric Storage Battery Company, manufacturer of Exide batteries, has announced a new plastic separator called Pormax, a polyvinyl chloride synthetic that is very porous, non-brittle, and more acid resistant than either wood or rubber separators. Tests indicate that their quality and life are equal to the total lifetime of several sets of wood separators in automobile batteries. The development is of particular significance with the diminishing supplies of good wood and of natural and synthetic rubber.

Write the editors for additional information on any of the above items.
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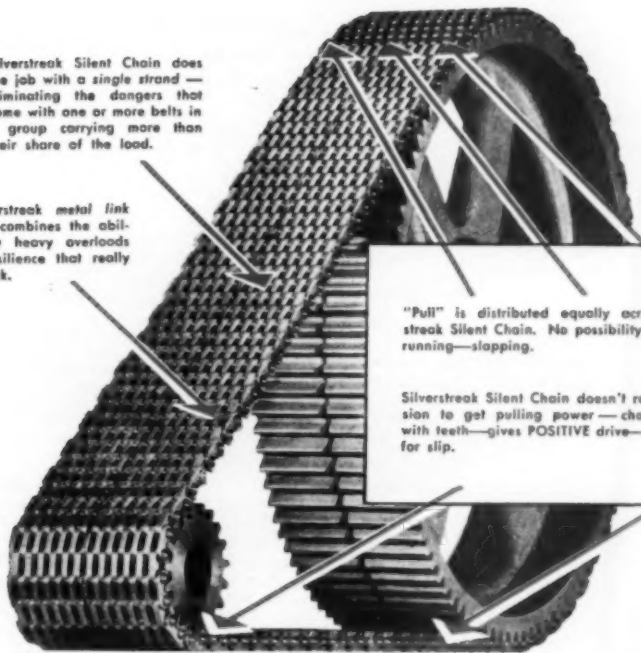
SLIP- PROOF SLAP- PROOF SHOCK- PROOF

Silverstreak Silent Chain does the job with a single strand — eliminating the dangers that come with one or more belts in a group carrying more than their share of the load.

Husky Silverstreak metal link construction combines the ability to carry heavy overloads with the resilience that really absorbs shock.

"Pull" is distributed equally across Silverstreak Silent Chain. No possibility of uneven running—slapping.

Silverstreak Silent Chain doesn't rely on tension to get pulling power—chain meshes with teeth—gives POSITIVE drive—no chance for slip.



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Get Full RPM Transmission With LINK-BELT Silverstreak Silent Chain Drives

Yes, get the amazing, trouble-free efficiency of 98.2%. A standard of operation that continues throughout the long, long life of the drive. More than this—every rating and design is backed by a record of *proven performance*. And every chain is engineered for the job. You conserve space, too—

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Little wonder, then, that so many concerns to whom top operation efficiency and rugged dependability are a must, standardize with Link-Belt Silverstreak Silent Chain Drives.

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THE SYMBOL OF QUALITY
SILVERSTREAK SILENT CHAIN DRIVES

"WE WERE LOSING 5 KILN MOTORS PER MONTH UNTIL WE CHANGED TO FUSETRON dual-element FUSES."

Malvin E. Adams,
Electrician

OZARK HARDWOOD COMPANY

PHONE 232

CLARKSVILLE, ARKANSAS
April 20, 1950

JOE B. MILLS, MANAGER

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St. Louis, Missouri

Dear Sir:

I have found a great savings in your Fusetrans.

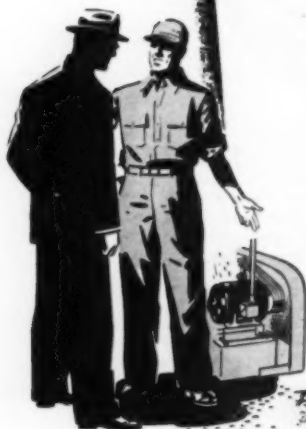
Two and one-half years ago I started changing my Dry Kiln motors to Fusetron protection. Up until I changed completely I was losing an average of 5 motors per month which was very expensive. I was having to fuse my motors too heavy to pick up the load, then if something went wrong the fuses were too heavy and held the motor on the line, therefore burning it up.

My Kiln motors are $1\frac{1}{2}$ h.p. 5 amp. I fuse them with 5 amp fusetron. The fusetron will hold this starting load and when it picks up I still have motor protection if anything goes wrong the fusetron will blow in time to keep the motor from burning up. I fuse my main pannell with 6 - 600 amp. fusetron. I used to blow fuses on this until I changed to fusetron, therefore, taking care of the surging load.

I have approximately 800 h.p. I fuse almost all the plant on fusetron. My trouble has been very light since changing to fusetron for motor protection. Fusetron is tops with me.

Yours very truly,

Malvin E. Adams
Malvin E. Adams
Electrician



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TRUSTWORTHY NAMES IN
ELECTRICAL PROTECTION

BUSS

Fusetron^{DUAL ELEMENT} Fuses

Give 10 Point Protection

- Protect against short circuits.
- Protect against needless blows caused by harmless overloads.
- Protect against needless blows caused by excessive heating — lesser resistance results in much cooler operation.
- Provide thermal protection — for panels and switches against damage from heating due to poor contact.
- Protect motors against burnout from overloading.
- Protect motors against burnout due to single phasing.
- Give DOUBLE burnout protection to large motors — without extra cost.
- Make protection of small motors simple and inexpensive.
- Protect against waste of space and money — permit use of proper size switches and panels.
- Protect coils, transformers and solenoids against burnout.

★ Fusetron Fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York City in December 1947.



What is the FUSETRON Dual-Element FUSE?

A fuse link combined with a thermal cut-out — the result, a fuse with tremendous time-lag and much less electrical resistance.

They have the same degree of Underwriters' Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to same dimensions as ordinary fuses, FUSETRON Fuses fit all standard fuse holders.

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Their cost is surprisingly low.

Don't risk losses in your plant!

One **lost** motor,
One **needless** shutdown,
One **destroyed** panel or switch,
One **burned out** solenoid —
May cost you more than replacing every ordinary fuse with a FUSETRON dual-element fuse.

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HEAVY FIREBRICK

For furnaces with slagging, flame impingement and spalling conditions, either B&W 80 or Junior Firebrick can be used. 80's assure uninterrupted service at extremely high ratings. Juniors are recommended where load bearing and temperature requirements are less severe, but too severe for the best grades of fireclay brick.

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B&W Insulating Firebrick have the lightest weight and lowest heat conductivity of any insulating firebrick in their class. They store and conduct less heat—withstanding direct exposure to furnace gases. Available in six types for temperatures from 1600 F to 2900 F.

PLASTICS

Used widely for repairs and for forming special shapes in place, B&W Plastic Moldable and B&W Plastic Chrome Ore offer

long life under severe conditions. Plastic Moldable is suitable for use in the great majority of furnaces. It withstands temperatures up to 3000 F. Plastic Chrome Ore is ideally suited for severe slagging conditions.

CASTABLES

In furnaces that require the high resistance of chrome to chemical attack and where speed of installation is important, B&W offers Kromecast for temperatures up to 3100 F and Hydrochrome for temperatures up to 2800 F.

For burner openings, door linings, walls, roofs and arches, B&W Kaocast possesses unusual volume stability and resists spalling. It easily withstands temperatures up to 3000 F.

B&W Baffle Mixes are excellent castables for the construction of monolithic boiler baffles, door linings and other general uses.

They are smooth and flow easily, have high strength in small sections. Widely used to withstand temperatures as high as 2600 F.

B&W Insulating Concrete Mixes combine refractoriness, light weight and low heat conductivity with the ability to be poured like ordinary concrete. For temperatures up to 2200 F.

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Yarway Impulse Steam Traps never allow condensate to accumulate and pull down working temperatures. They discharge the condensate *as fast as it forms*. Result—equipment always operates at highest efficiency.

Couple this fact with other features like small size, easy installation, only one moving part, non-freezing, good for all pressures, low cost—and you know why more than 650,000 Yarway traps have already been installed.

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IMPULSE STEAM TRAP

MORE POWER FOR DEFENSE



MECHANIZE Your Boiler Water Conditioning!

- IMPROVE HEAT TRANSMISSION
- SAVE FUEL
- REDUCE COSTLY SHUTDOWNS FOR REPAIRS AND CLEANING



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CHROMALOX offers you efficient and economical *Packaged Electric Heat*—to fit your specific needs

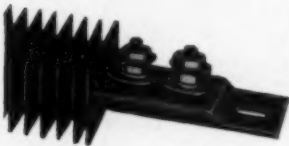
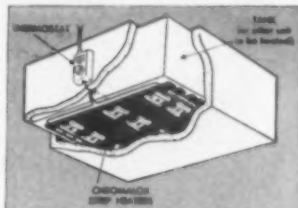
CHROMALOX Electric Heaters give dependable "on-the-spot" heat where and when heat is needed. They produce uniform and accurate temperatures with

automatic or manual control. Low initial cost, low installation cost and low operating costs are among the other advantages they give you.



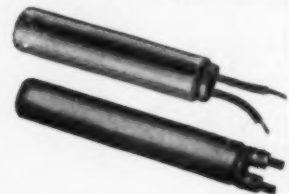
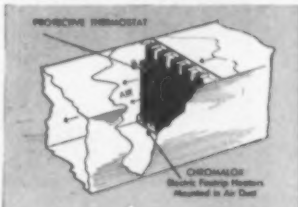
CHROMALOX STRIP HEATERS

Easy-to-install CHROMALOX Strip Heaters are clamped to flat or curved surfaces, round vats, pipes and tubes. They are made in straight lengths, rings and segments . . . and may be curved or bent to fit cylindrical or "dished" surfaces. Typical applications include: armatures, cleaning tanks, molds, process kettles, plating baths, revolving rolls, etc.



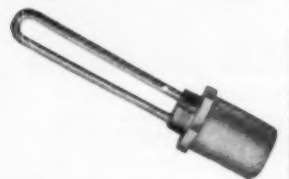
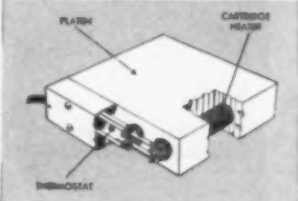
CHROMALOX FINSTRIP HEATERS

Finstrip Heaters are used for drying, curing, space heating and other applications requiring heated air under forced circulation. Air and gases are quickly and easily heated; uniform operating temperatures up to 750° F. are accurately maintained by thermostatic control. Finstrips, designed for minimum turbulence, are well suited for use in air-ducts.



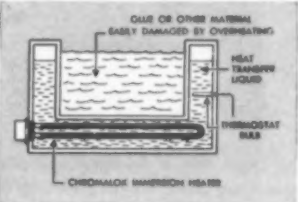
CHROMALOX CARTRIDGE HEATERS

Compact CHROMALOX Cartridge Heaters are ideal for use when concentrated heat is needed. Inserted into close-fitting holes, they provide easily controlled heat for dies, molds, platens, etc. They are quickly and easily installed in stationary or moving parts with minimum labor and material costs; they may be controlled for accurate, dependable, care-free operation.



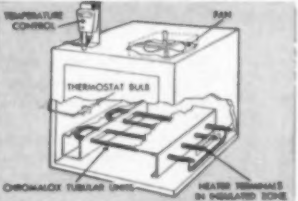
CHROMALOX IMMERSION HEATERS

CHROMALOX Immersion Heaters are used in degreasing, cleaning, pickling and plating baths; for melting greases, asphalts and similar viscous fluids; for heating Dowtherm, Arochlor, Prestone, and other heat-transfer mediums. Available in many sizes and types, with alloy sheaths to resist corrosive action.



CHROMALOX TUBULAR HEATERS

These heaters, in straight or tailored shapes are used for convection, conduction and radiant heating. They may be clamped to metal surfaces, used in ovens, or immersed in greases. They are especially useful to heat ovens, calendars, molding-presses and similar equipment utilizing heat.



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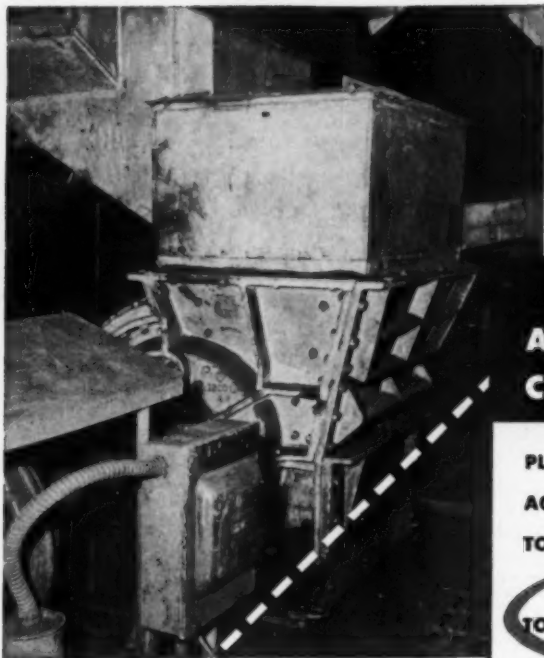


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SOUTHERN POWER & INDUSTRY for APRIL, 1951

These "CRUSHING" FACTS



Another American Crusher CASE HISTORY

PLACE: Illinois Coal Mine

AGE OF CRUSHER: 14 years

TOTAL TONNAGE CRUSHED:
1,472,805

TOTAL COST PER TON:
one half of 1¢*

— again prove
AMERICAN CRUSHER performance

*

The total cost figure for the 14-year coal crushing operations of the Illinois coal mine, whose American Crusher record is shown above, includes: original cost of crusher (completely depreciated); plus cost of replacement parts; plus maintenance costs; plus interest on original investment (at 3% for 14 years).

But here is the really significant fact: an independent survey of Users of American Equipment has shown that this performance record is a typical one for Americans

... a consistent pattern of high tonnage reduction at remarkably low parts-replacement cost.

Only such features as the exclusive Crushing Ring Design ... originated and perfected by American ... could reduce coal in power plants and coal mines across the country year after year, ton after ton, for less than 1¢ per ton.

Find out how you may reduce the cost of your own crushing problems.
WRITE for detailed information and illustrated literature.

CRUSHING

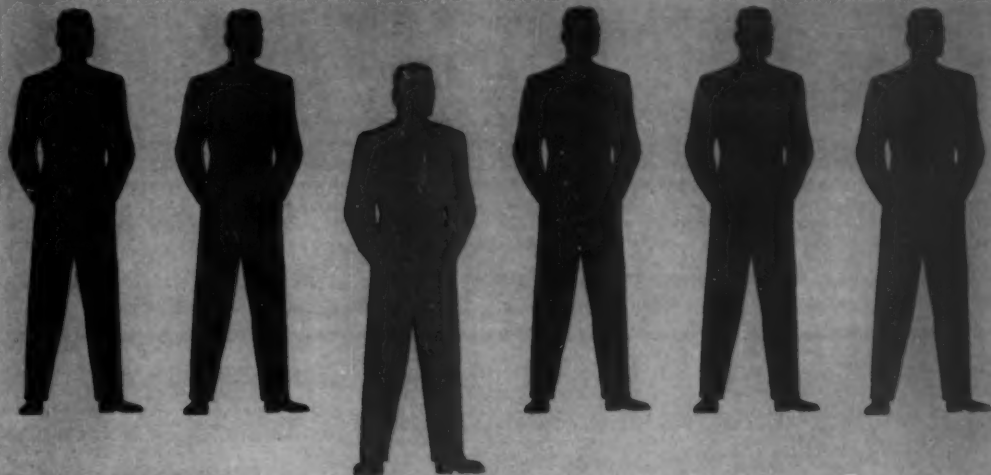


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Originators and Manufacturers of
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For example, in the manufacture of Okolite-Okoprene cable, here are a few specific instances of how these experienced testing and inspecting men at Okonite protect your cable investment:

... Immediately after mixing, a sample of every individual batch of insulating compound is vulcanized and laboratory tested to check formulation and required characteristics, before any further processing can take place.

... A recently-developed technique permits electrical

testing of every foot of the insulating compound strips *before application* to the conductors. This is another advantage of the Okonite strip-insulating method, used in making all Okolite-Okoprene cables.

... Every foot of Okolite-Okoprene is subjected to super-voltage a-c and d-c tests to check out even the tiniest concealed imperfection. These super-voltage tests are the most severe in the entire cable industry.

These are just a few of the complete testing and inspection steps taken at Okonite that assure you the extra circuit protection and long life you expect when you buy Okolite-Okoprene cables. Write for Bulletin SP-2009 which contains detailed information about Okonite's unique manufacturing methods and policies. The Okonite Company, Passaic, N. J.



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ELECTRICAL

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Continued on page 130

Please send me without obligation, free booklets described in the April, 1951 issue of SOUTHERN POWER AND INDUSTRY as circled below:

1	5	9	10	37	81	84	87	88	89	101	103	107	109	110	120	148
200	201	202	203	204	206	207	214	257	259	301	303	305	309	312	357	401
503	405	406	414	415	450	458	459	464	501	503	505	507	510	524	546	551
601	602	603	604	608	640	671	675	692	706	707	709	710	754	756	772	793
805	806	809	810	811	833	837	851	853	864	810	811	812	813	814	815	816
817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833
834	835	836														

Also send further information on following New Equipment (see pages 95-116)

E1 E2 E3 E4 E5 E6 E7 E8 E9 E10 E11 E12 E13 E14 E15 E16 E17 E18
E19 E20 E21 E22 E23 E24 E25

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Equipment and Review Editor
SOUTHERN POWER & INDUSTRY
806 Peachtree St., N. E.
Atlanta 5, Ga.

List Items You Want,
Tear Out and Mail
One of the
Attached Cards
Now!

Please be sure to fill in your Firm's Name and your position on the Coupon. This service cannot be extended to you unless this information is furnished.

The TERRY TURBINE



TURBINES FOR Air Conditioning AT MADISON SQUARE GARDEN

In 1925 Madison Square Garden installed three Terry Multi-Stage Turbines to drive air conditioning and refrigeration compressors. These units deliver 290 hp at 3500 rpm with steam conditions of 100 psi exhausting to a 26 in. vacuum.

After 22 years experience Madison Square Garden installed three more Terry Multi-Stage Turbines, one of which is shown above. This unit delivers 330 hp, at 5650 rpm, with

steam at 100 psi exhausting to a 25 in. vacuum.

The same engineering talent and manufacturing facilities that produced these turbines are available to assist you in obtaining efficient power generation.

Any of our District Representatives will be pleased to give you full information on a turbine drive for your requirements. No obligation. May we send you descriptive bulletin?

**THE TERRY STEAM
TURBINE COMPANY**
TERRY SQUARE, HARTFORD, CONN.

TT 1184

This man ...

IS YOUR HELPER!



There is a man in your community who stands at your elbow to instantly supply the tools, materials, parts and equipment you may require in production and maintenance operations of your factory —upwards of 10,000 different products from abrasives to zinc sheets.

What a time-killing task it would be to procure all these items from their infinitely various original sources. How economical and convenient it is simply to phone this man, tell him what you want and know that, often within a matter of minutes, it will be in your receiving department.

Accessible

"This man" is an industrial distributor* or a specialist in certain industrial items. You will find him listed in the classified section of your telephone book—most likely under the heading Bars, bronze or Bearings, bronze. If he is the leading distributor, he almost certainly is the Bunting Distributor. He carries in stock for your money saving convenience Bunting Standard Stock Industrial Bearings, Electric Motor Bearings, and Precision Bronze Bars—ask him for catalog.



There are approximately 2000 Industrial Distributors serving every industrial section of the United States. In 1948 their total sales were more than \$3,000,000,000. They carry an average inventory of \$500,000,000, turn their stocks 5 to 6 times per year, fill 200,000 orders per day, have 12,000 outside salesmen and engineers, 10,000 inside telephone order expeditors, operate 8000 trucks delivering merchandise on which their average net profit is .0292 cents per dollar of sales.



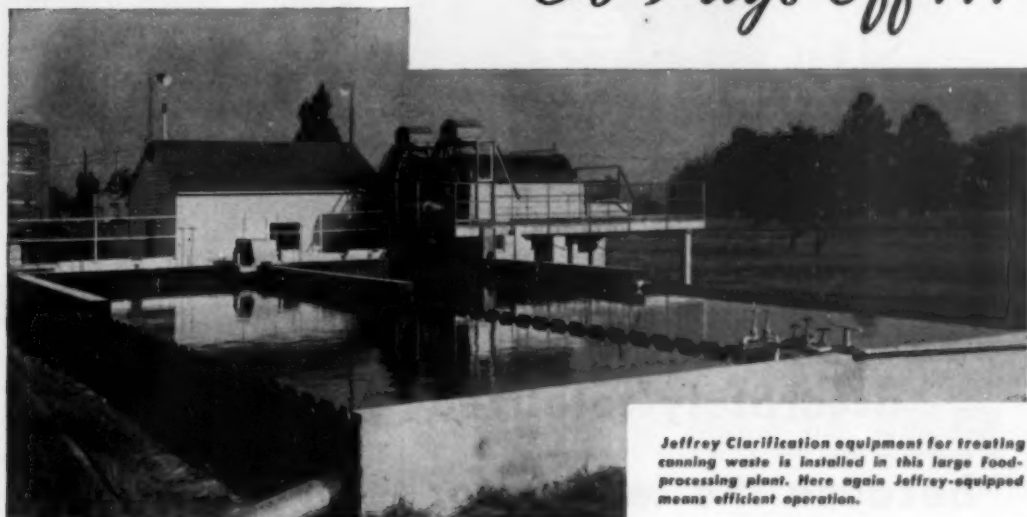
Bunting®

BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

THE BUNTING BRASS & BRONZE CO., TOLEDO 9, OHIO

TREAT INDUSTRIAL WASTE RIGHT

It Pays Off...



Jeffrey Clarification equipment for treating canning waste is installed in this large food-processing plant. Here again Jeffrey-equipped means efficient operation.

Industrial Waste is the Peck's Bad Boy in nearly every plant . . . always in bad with the neighbors as well as State Pollution Control Commissions.

Clarification of industrial waste need not be such a bad problem. Jeffrey has the facilities for proper and efficient waste treatment . . . can help you keep the nation's waters clean. For meeting exacting specifications we can furnish Collector mechanisms for Grit Chambers and Settling Basins, Screens,

grease and oil Skimmers, Flocculation equipment, etc., backed by years of experience in designing and building the best in Sewage and Water treatment equipment.

We will be glad to send you some of the names of outstanding plants in which Jeffrey equipment is doing a real job on the purification of sewage and concentrated organic wastes . . . and paying off. May we hear from you?

Bar and Disc-type Screens
Sludge Collectors
Sludge Elevators
Grit Washers and Collectors

FLOCTROLS (controlled flocculation)
Equipment for Biofiltration plants
Transmission Machinery
Scum Removers
Garbage Grinders

Chemical Feeders
Screenings Grinders
Belt and Spiral Conveyors
Chains and Sprockets

THE JEFFREY

MANUFACTURING COMPANY Established 1877

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The Ohio Malleable Iron Co., Columbus, Ohio

British Jeffrey-Diamond Ltd., Wakefield, England
The Gallen Iron Works & Mfg. Co., Gallen, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

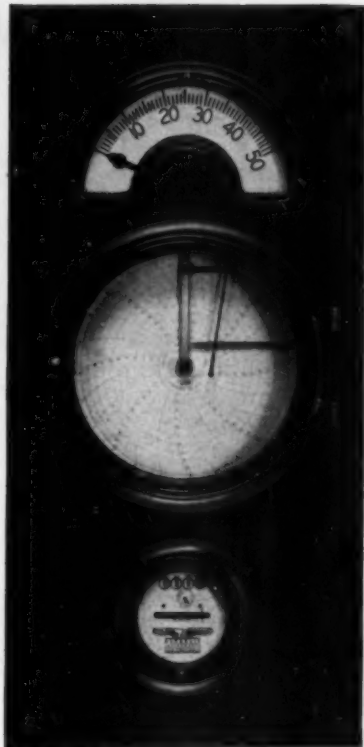
Complete Line of
Material Handling,
Processing and
Mining Equipment





Integrator

Varying flows are accurately totalized because the integrator is continuous



Indicator-Recorder-Integrator

The Republic flow integrator, being of the modified watt-hour type, totalizes continuously—not intermittently. It operates independently of the recorder and its accuracy is not dependent on or affected by any clock mechanism or mechanical action.

The Republic meter is, on this account, peculiarly fitted to follow all changes in flow rate and accurately measure highly fluctuating flows.

ALL TYPES OF FLUIDS

Republic electric type flow meters are available for measuring the flow of all types of liquids and gases. Meter bodies are built for metering fluids at line pressures up to 5,000 lb. per sq. in. and for all ranges of differential pressure. The reading instruments—indicator, recorder and integrator—are of the remote reading type and can be located any distance from the point of flow measurement.

ANY COMBINATION

While each Republic reading instrument is standard in design and construction each is especially calibrated for the particular flow measurement for which it is specified. Any reading instrument, indicator, recorder

or integrator, may be obtained separately or in any combination desired, making possible the highest degree of flexibility in plant use.

SIMPLE IN OPERATION

The Republic electric meter is the only flow meter commercially manufactured which is strictly electric in its operation. All other types of so called electric meters use the motion of the mercury to move a float or produce a force which is then converted into an electrical value which is in turn transmitted to a receiving or reading instrument. In the Republic meter, the transmitted electrical value is determined directly by the mercury motion, thus eliminating one of the steps in the sequence, and simplifying the mechanism to that extent. There are no floats, levers, cams, rotating shafts or anything else to interfere with the unimpeded movement of the mercury, which has no work to perform, but merely fulfills the function of making contact.

NEW DATA BOOK

Just off the press—a completely new data book describing and illustrating, in detail, the operating features of the Republic Flow Meter and its many applications. Write for your copy of Data Book No. 702—there is no obligation.

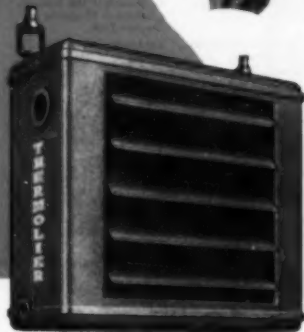
REPUBLIC FLOW METERS CO. • 2240 DIVERSEY PARKWAY • CHICAGO 47, ILLINOIS



"HET UP" about YOUR wasteful heating SET UP?

Why not change to

THERMOLIER UNIT HEATERS



THERMOLIER CONSTRUCTION FEATURES THAT SAVE MONEY

Use of plain thermostatic trap, the simplest and least expensive kind of trap, is practical because of Thermolier's exclusive internal cooling leg.

Maximum capacity provided at all times and annoying, destructive water hammer eliminated by built-in pitch of tubes and internal cooling leg which assures continuous drainage of condensate.

Damaging strains caused by expansion and contraction eliminated by "U" type expansion tubes.

Safety and durability assured with leak-proof tube-to-header construction.

Eight other important features. Write for Thermolier Catalog.



Horizontal
Delivery



Textile
Model



Velocity
Nozzle



Vertical
Delivery

If you're dismayed about *last winter's* high-cost-of-heating, how about next year — when it may be as hard to get *fuel*, as it was for you to get *heat* this year?

Here's a red-hot tip. To save heat and fuel, install Thermolier Unit Heaters. But don't delay. Material shortages can seriously disrupt the production of unit heaters. In addition, skilled men are available to make installations now. They may not be in the days ahead. Study these Thermolier Unit Heater advantages — and act promptly.

HEATING COMFORT Thermoliers provide quick heating from a cold start. Desired room temperatures are easily maintained within a close range.

LOW FIRST COST Thermoliers are so efficient and so compact that their heating capacity is often equivalent to the capacity of cast iron radiation or pipe coils of twice the cost.

ECONOMY OF OPERATION Heat is forced down to the working level . . . not banked uselessly at the ceiling level.

ADAPTABILITY TO EQUIPMENT AND FLOOR LAYOUT Thermolier unit heating is widely used in industrial plants and warehouses, garages, stores and public buildings. The units and the simple piping are overhead where they do not interfere with arrangement of the operating machinery or equipment.

GRINNELL

WHENEVER PIPING IS INVOLVED



GRINNELL COMPANY, INC., Providence, R. I. Warehouses: Atlanta • Billings • Buffalo • Charlotte • Chicago
Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach • Los Angeles • Milwaukee • Minneapolis • New York
Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

*An Important Message for
the Power Plant Field!*

How to Get the Most Value for Your Water Conditioning Dollar!

INVESTIGATE INFILCO EQUIPMENT

The money you spend for a Water Conditioning Plant is a dividend paying investment only when you get equipment which fits your specific needs and which affords satisfactory service—year in, and year out. INFILCO gives you more than just tanks, pipes and a means of effecting chemical reactions. Back of each installation is the knowledge gained from over 55 years of water conditioning research. Behind each installation is the "know how" that means *the right equipment for the particular task*. Infilco offers a complete range of treatment equipment, which permits a selection tailored to the need.

Year after year, Infilco Equipment stands the test of time. The extra value of sturdy construction and realistic ratings pays off in more trouble-free, long service life. Investigate, today, the value you get from Infilco Water Conditioning Equipment. Call in the nearest Infilco Field Engineer. He's only a phone call away. There's no obligation, of course—only the obligation to yourself to investigate why Infilco Equipment is a good buy.

**SERVING THE POWER PLANT FIELD WITH
WATER CONDITIONING EQUIPMENT THAT'S**

*Quality Engineered for
Quality Performance*

INFILCO INC.

NEW YORK 17 • TUCSON • CHICAGO 16

SALES OFFICES IN TWENTY SIX PRINCIPAL CITIES

WORLD'S LEADING MANUFACTURERS OF WATER CONDITIONING AND WASTE TREATING EQUIPMENT

A WIDE RANGE OF INFILCO WATER CONDITIONING EQUIPMENT SERVES THE POWER NEEDS OF MANY INDUSTRIES

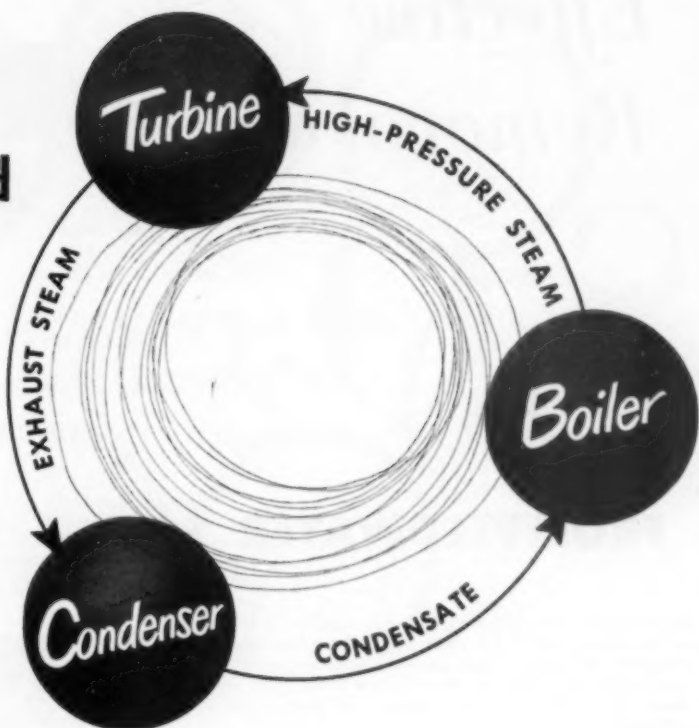
INDUSTRY	EQUIPMENT
Pulp Mill, Wisconsin	Accelerator® + Hot Process Accelerator + Phosphate Reaction Tank
Pharmaceutical Plant, Pennsylvania	Hot Process Accelerator
Chemical Plant, Kentucky	Hot Process Accelerator + Hot Process Zeolite Softener
Central Station, Illinois	Demineralization + Silica Removal Equipment
Steel Mill, Penn.	Accelerator + Zeolite Softener
Industrial Power Plant, Mississippi	Accelerator + Hydrogen Catalyst®
Chemical Plant, Texas	Demineralization Equipment
Pigment Plant, Missouri	Accelerator + Two Stage Hot Process Accelerator
Brewery, Wisconsin	Combined Sodium-Hydrogen Zeolite (Controlled Exchanger)

Send for...

New Bulletin No. 1855. It gives interesting facts and pictures on boiler feedwater treatment and the Hot Process Accelerator.



Merry-go-round
with
many
problems



THE problems involved in steam generation, steam use, and the subsequent condensation of steam into water are complex and difficult, presenting an almost infinite variety of intricate cross-relationships.

The correct solution of these problems is, however, imperative, for the availability of a boiler depends directly on the proper water treatment and the care and precision with which prescribed procedures are carried out.

Hall Laboratories not only understands these problems but knows their implications in terms of plant

construction and operation, and of plant personnel. Hall knows, too, that the answer must ultimately be in terms of dollars and cents.

In these, and in all other problems relating to the industrial use of water, Hall Laboratories is prepared to recommend procedures which, taking all factors into account, represent the most economic and efficient solution in your specific situation.

May we send you a copy of the new Hall bulletin "Your Most Important Raw Material"? Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.

HALL *plant-wide* WATER SERVICE

BOILER WATER CONDITIONING
PROCUREMENT, TREATMENT, USAGE AND DISPOSAL OF INDUSTRIAL WATER

Effective Removal of SiO_2

FROM FEEDWATER

You can be sure of the high precise degree of silica removal best suited for your particular plant needs, whether you operate high pressure or moderate pressure boilers with one of Graver's two basic types and more than 16 standard designs of hot process softeners.

In the Graver type S softener, intimate and prolonged contact of the raw water with silica absorbing magnesium oxide is provided by passing the water upward through a deep dense sludge bed.

This principle also removes organic matter while polishing the softening action on the water and it is particularly adapted to uniform loads.

In the Graver type F softener, complete removal of silica, even with extremely variable loads and unusual water conditions, is assured by recirculating the sludge containing magnesium oxide, which is the active material for silica removal.

In all Graver hot process softener designs, the exceptionally low rising rate of treated water from the sludge bed to the discharge, due to the special down-comer design pioneered by Graver . . . half the rising rate in other designs . . . provides clearest treated water and least load on filters.

*Write for 36 page bulletin describing
Graver hot process softeners in detail.*



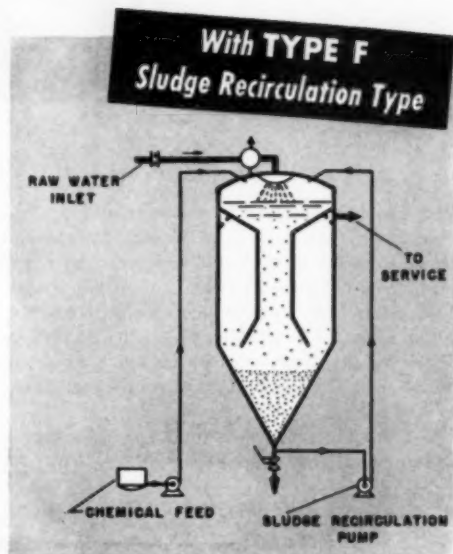
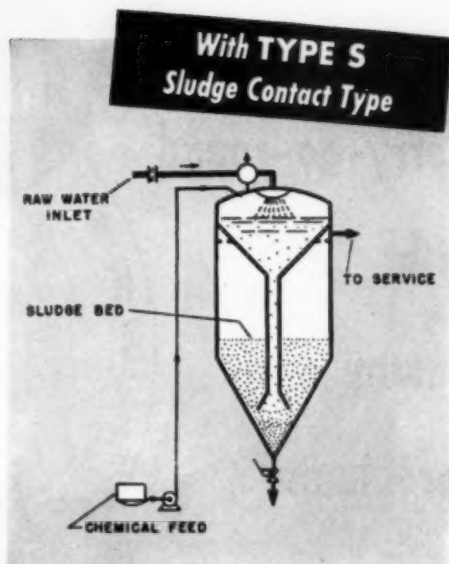
GRAVER WATER CONDITIONING CO.

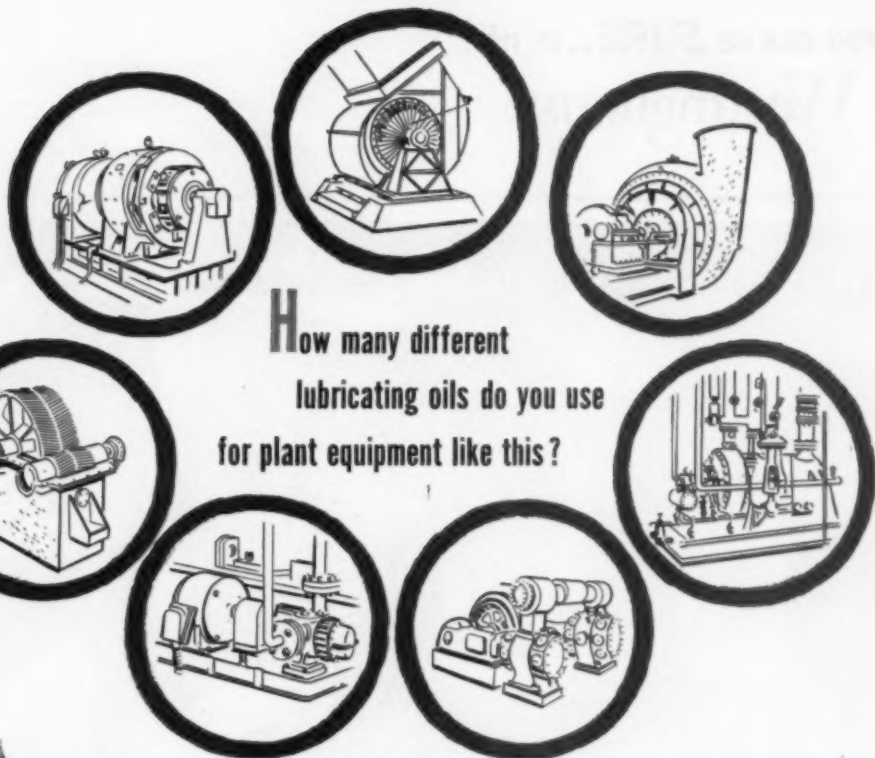
Division of Graver Tank & Mfg. Co., Inc.

216 WEST 14TH STREET, NEW YORK 11, N. Y.

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GW-438





How many different
lubricating oils do you use
for plant equipment like this?

—▶ ***You need only one—***
GULF HARMONY OIL

the outstanding many-purpose lubricant

for: Motors and Generators • Fans • Blowers • Pumps • Compressors • Hydraulic Mechanisms • Gear Units

Gulf Harmony Oil is a top quality many-purpose lubricating oil, ideal for sleeve-type bearings, oil-lubricated ball and roller bearings, hydraulic systems, compressor cylinders, and many types of gears.

Because of outstanding oxidation stability, Gulf Harmony Oil has exceptional resistance to sludging. In force-feed circulating systems, oil reservoirs, hydraulic lines, and antifriction bearings, the use of Gulf Harmony Oil helps prevent harmful deposits, insures fewer oil changes.

Gulf Harmony Oil provides a protective film which has preferential wetting characteristics for metal—it displaces moisture, interrupts its corrosive action. Thus Gulf Harmony Oil prevents rust on all oil-bathed surfaces—particularly important in antifriction bearings operating under damp conditions. And it separates readily from water, reducing the possibility of emulsification.

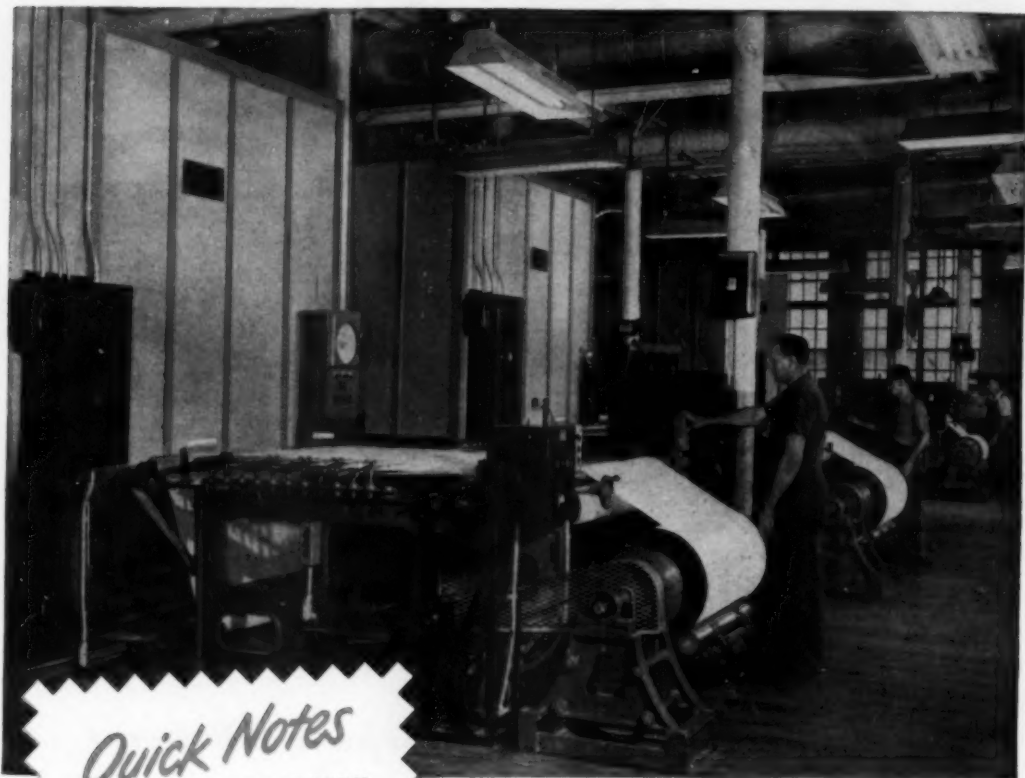
Its high lubricating value means more effective pro-

tection against wear under boundary conditions. Available in a wide range of viscosities.

For complete information on Gulf Harmony Oil and for expert help on any lubrication problem, call in a Gulf Lubrication Engineer today. Gulf Oil Corporation • Gulf Refining Company, Gulf Building, Pittsburgh 30, Pennsylvania.



YOU CAN BE **SURE**.. IF IT'S
Westinghouse



Battery of Slashers in Borden Mills plant at Kingsport, Tenn.

Quick Notes
ON THE SOUTHERN
TEXTILE INDUSTRY

- Dollar volume quadrupled in the last ten years.
- Twenty-seven percent more mills in operation since '39.
- Second ranking Southern industry in product value.
- Employs every fifth Southern manufacturing worker.

BIG NEWS IN TEXTILES

Progressive southern mills now weave better cloth faster, thanks to Slashers equipped with a revolutionary Westinghouse Drive. Basic secret—precise tension control.

Slashing comes just before weaving. Warp yarn is pulled through a bath of starch "sizing" to make it stiff for the loom. But too much pull in the Slasher weakens the yarn. This often happens when Slashers have mechanical "friction" drives. When the yarn is put on the loom, threads break and the loom must be stopped. Costs go up and the resultant cloth is not uniform.

Westinghouse licked the problem with an all-electric Slasher Drive that makes overstretching practically impossible. Net result—better cottons, rayons, worsteds for the customers, lower costs for mill operators.

The engineering talent that developed this significant money saver is available to you. When you want help on any electrical problem, get in touch with your Westinghouse office.



Why is the **SOUTH** growing faster than the rest of the U. S.?

Figure it on the basis of electric power output, a good yardstick of industrial growth. In the last ten years, kwhr production in the U. S. has increased 127%. *In the South, it's up 170%.* This means growth—more plants, more production, more income. Sample—since 1939 the dollar volume of manufactured goods in the South has jumped 248%!

What's the reason for this growth? Many things—abundant raw materials, high-grade labor supply, low-cost power, good markets. Established industries are expanding, new industries see the advantages and move in.

Westinghouse recognized the advantages a long time ago. Early in our development we built manufacturing plants in the South.

These plants now employ some 8,000 people. They use raw materials from Southern mines, mills, farms and forests—as do our factories elsewhere.

Our partnership with the South has worked both ways. A large part of the power generating apparatus needed for industrialization was supplied by Westinghouse. Through technical developments, such as the textile Slasher Drive on the opposite page, we have helped Southern industries make goods better and cheaper.

As an organization with deep roots in Southern soil, we have a basic stake in its future. Our job is to serve you. When you have problems in the development or use of electricity, contact your Westinghouse office.

J-W2002

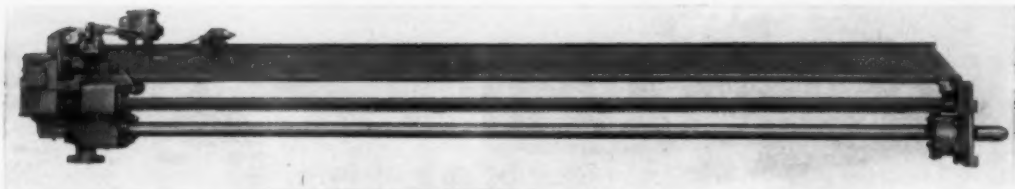
Westinghouse

A BASIC PART OF THE SOUTH



The "LONG" and the "SHORT" of *Better Boiler Cleaning--at Lower Cost!*

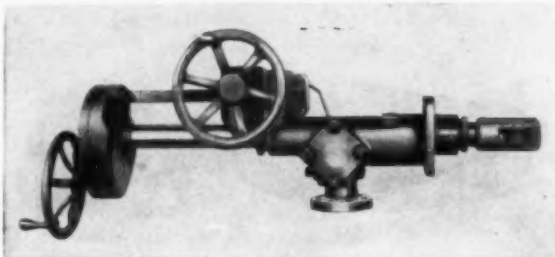
• Here's the LONG of it . . .



Vulcan T-2 Long Retractable Blower, for travels up to 25 feet, is ideal for hard-to-clean surfaces. Lance shown retracted (not in action) for protection against high furnace

temperatures, thus cutting maintenance costs. Operated by push button at unit or at central control panel. Install at any angle, indoors or outdoors.

• Here's the SHORT of it . . .



Manually-operated Vulcan HG-1 Gun Type Blower, 12- or 24-inch travel, blasts hard-to-clean deposits from boiler, water wall and superheater surfaces. Air or steam. Easy to operate. Practically no maintenance costs. For automatic operation, use Vulcan RW-1.

Mail this
Coupon TODAY

Is your soot blower maintenance too high? Is it costing you too much to keep your boilers clean? Then it's time to call in a Vulcan engineer to study your problem. Chances are he'll help you find ways to cut maintenance and cleaning costs materially. His survey will cost you nothing—and could save you a lot of money. No obligation. Just mail the coupon—NOW.

VULCAN SOOT BLOWER DIVISION

Continental Foundry & Machine Company
DUBOIS, PENNSYLVANIA

VULCAN SOOT BLOWER DIVISION
DUBOIS, PENNSYLVANIA

Without obligation to me, please send your engineer to survey our soot blowing equipment and show us how we might cut our boiler cleaning costs.

Name

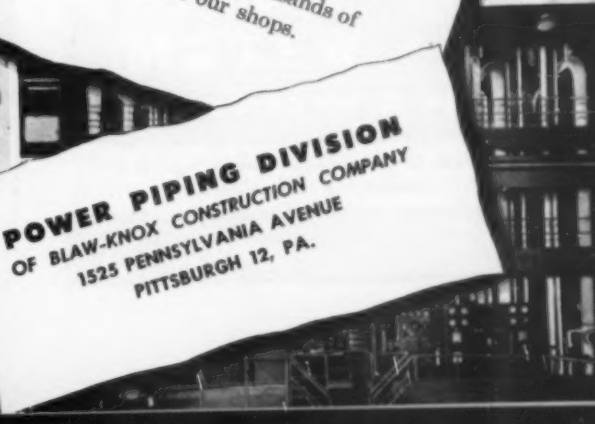
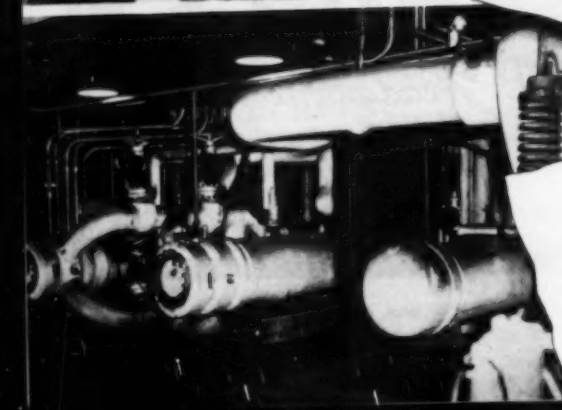
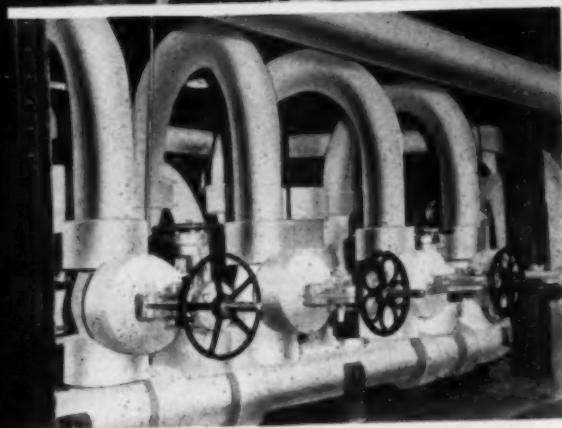
Position

Company

Street Address

City State

VULCAN  **Automatic Soot BLOWERS**

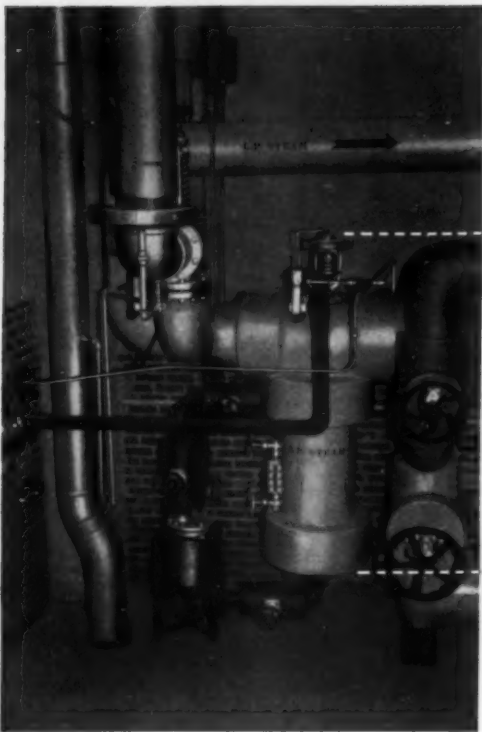


HOW INTRICATE CAN POWER PIPING BE?

Some of the piping requirements received here at Power Piping would gladden the heart of a pretzel-bender. But whatever the contour, size, tolerance or specifications, our prefabricated jobs never fail to fit the installation like a glove.

Also we find a lot of satisfaction in the fact that Power Piping Division, over the years, has been called upon to furnish many intricate components for plants thousands of miles distant from our shops.

POWER PIPING DIVISION
OF BLAW-KNOX CONSTRUCTION COMPANY
1525 PENNSYLVANIA AVENUE
PITTSBURGH 12, PA.



8-inch COPES Desuperheater installed for flows of up to 95,000 pounds per hour, to reduce steam temperature from 750 degrees F. to 475 degrees F. 175 psi.

TYPICAL LIST OF ORDERS from SOUTHERN PLANTS

American Tobacco Co., Louisville Ky. & Richmond, Va.
City of Blackwell, Oklahoma
Celanese Corporation of America, Calco, Va.
City of Coleman, Texas
E. I. du Pont de Nemours & Co., Richmond, Va.
City of Dyersburg, Tenn.
Florida Power & Light Co., Sarasota, Fla.
City of Henderson, Kentucky
University of Houston, Houston, Tex.
Mead Corp., Kingsport, Tenn.
City of Monroe, La.
North Carolina State Hospital, Morgantown, N.C.
Oklahoma A. & M. College, Stillwater, Okla.
Procter & Gamble Manufacturing Co., Dallas, Tex.
Public Service Company of Oklahoma, Hugo, Okla.
Sheffield Steel Co., Houston, Tex.
Tennessee Coal, Iron & Railroad Co., Ensley, Ala.
Transcontinental Pipe Line Co., Tylertown, Miss.

COPES DESUPERHEATER

completely self-contained

costs LESS to install

With the temperature control element built into the mixing chamber, you need no long run of alloy steel piping in the steam line—no extra connections into this line—no long run of piping back from the temperature element to the desuperheater. With cooling water atomized inside the chamber, you need no extra steam atomizing valve and line with extra stop valves.



Installed and ready for round-the-clock service, a COPES Desuperheater offers you more than appears in the purchase price.

First of all, you'll find the installation simple and inexpensive, no matter what your piping layout.

You'll find operation and maintenance easy and low cost because of compact design, rugged construction.

You'll find the temperature control accurate, even on lightest flows, because cooling water is controlled and atomized inside the mixing chamber.

You'll find adjustments, if needed, simple and easily made by your plant personnel.

If you have a specific application in mind, write in detail about your requirements. If you want only general information, ask for Bulletin 405-C.

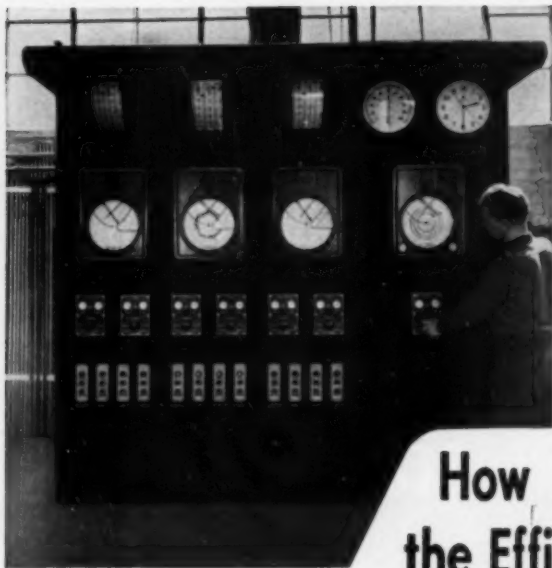
**NORTHERN EQUIPMENT DIVISION
CONTINENTAL FOUNDRY & MACHINE COMPANY
413 GROVE DRIVE, ERIE, PENNSYLVANIA**

COPES



Headquarters for . . .

Boiler Feed Water Control . . . Excess or
Constant Pressure Control, Steam or Water
. . . Liquid Level Control . . . Balanced Valves
. . . Desuperheaters . . . Boiler Steam Tem-
perature Control . . . Hi-Low Water Alarms.



These Bailey Boiler Controls at the Chicago Pneumatic Tool Company's new plant in Utica, N. Y., insure efficient operation of three 25,000 lb per hour, 100 psi, spreader stoker-fired boilers

How to INCREASE the Efficiency of YOUR BOILER-ROOM DOLLAR

Before you get steam you've got to spend dollars—so dollars are a form of energy.

And if your boiler-room dollars are invested in equipment that isn't working efficiently, economically, your "investment" is poor.

That's where co-ordinated controls by Bailey can help. Here's why they'll increase your "boiler-room investment efficiency":

1. **Complete Range of Equipment—fully co-ordinated.** You need never worry that a Bailey Engineer's recommendation is slanted in favor of a particular type of equipment, just because he has a limited line to sell—or that Bailey will pass the buck for efficient control; we offer *complete* boiler control systems.
2. **Engineering Service—backed by experience.** No other manufacturer of instruments and controls can offer as broad an experience, based on successful installations involving all types of combustion, flow measurement and automatic control.
3. **Direct Sales-Service—conveniently located near you.** Bailey Meter Company's sales-service engineers are located in more

industrial centers than those of any other manufacturer of boiler control systems; you get prompt, experienced service with a minimum of travel time and expense.



For better "boiler-room investment" efficiency—for more power per fuel dollar, less outage and safer working conditions, you owe it to yourself to investigate Bailey Controls. Ask a Bailey engineer to arrange a visit to a nearby Bailey installation. We're proud to stand on our record: "More power to you!"

A-111-0

**BAILEY
METER
COMPANY**



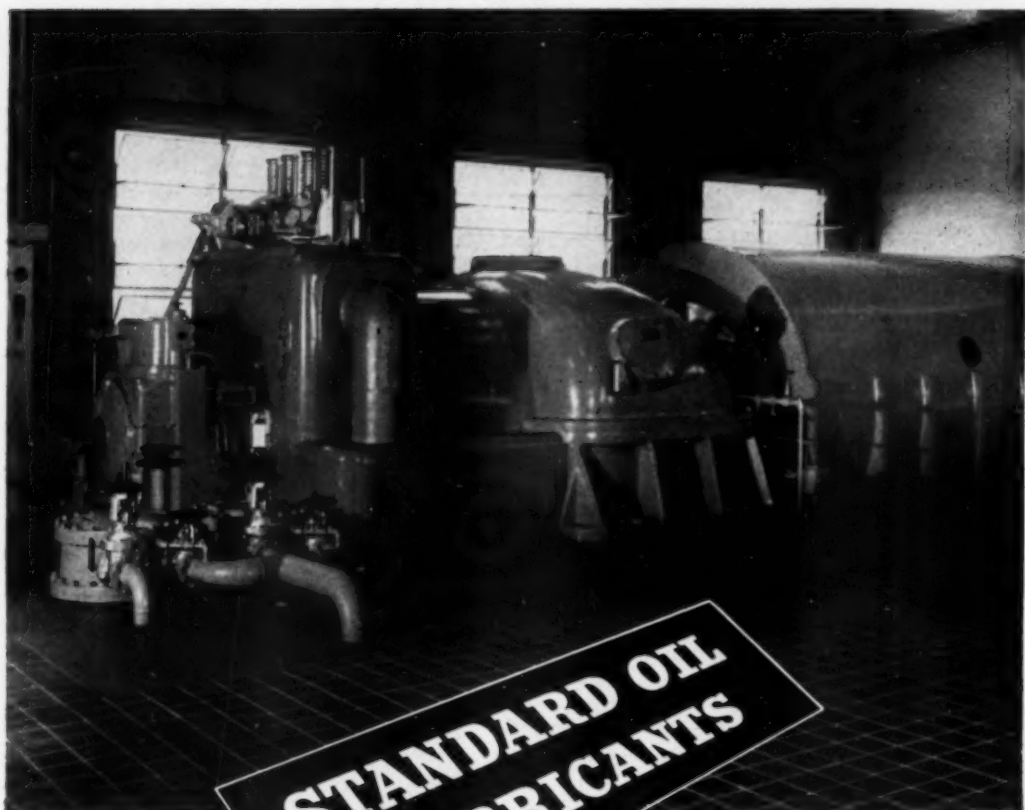
1028 IVANHOE ROAD
CLEVELAND 10, OHIO

Controls for Steam Plants.
COMBUSTION - FEED WATER
TEMPERATURE - PRESSURE
LIQUID LEVEL - FEED PUMPS

The best turbine oils are those that free themselves of air and water, resist oxidation and rust, and eliminate sludge and gum tendencies. Standard Oil turbine oils have been famous for these *very* qualities for many years. They have shown little or no trace of oxidation after years of service in industrial, public utility and marine installations, often far

minus air and water

surpassing the performance record of the oils which they replaced. They are refined by the most modern methods, from carefully selected crudes, assuring the highest possible resistance to oxidation, rusting and foaming. For dependable turbine lubrication, consult one of our representatives. Remember—the combined facilities for research, testing and engineering behind the line of industrial lubricants he offers, are *unequaled*.



STANDARD

OIL COMPANY (KENTUCKY)

This Simple
**AMERICAN MONORAIL
SYSTEM Saves... \$12,800**

**Annually in
HANDLING COSTS**

A saving of 64 man-hours per day (2 shifts) resulted when this unique, simple American MonoRail Overhead Handling System was installed. Thirty-two freight car panels are strapped into one bundle—then by aid of a RailMaster Crane and special carrier on crane bridge, two men are able to transfer bundles from shipping room to dock directly into gondola cars.

This entire MonoRail system cost less than \$10,000. The yearly savings run well over this figure, therefore the system pays for itself in less than one year.

We'll be glad to apply this "know-how" to your handling problems—just drop us a note. No obligation, of course.



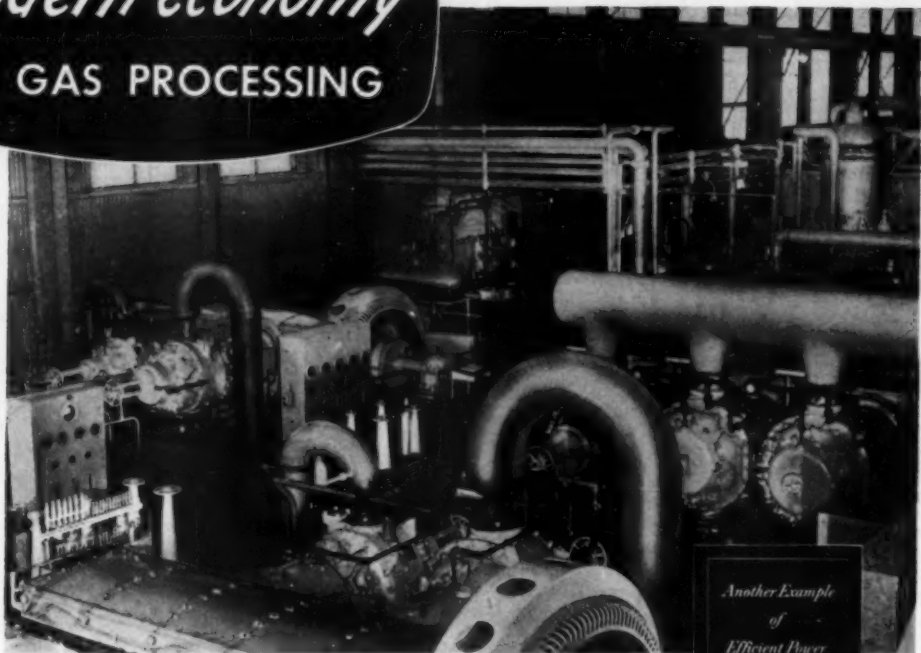
THE AMERICAN MONORAIL COMPANY

13105 ATHENS AVENUE

CLEVELAND 7, OHIO

SOUTHERN POWER & INDUSTRY for APRIL, 1951

TEAMED UP FOR
modern economy
IN GAS PROCESSING



Another Example
of
Efficient Power
at Lower Cost

Cooper-Bessemer motor-driven JM compressors

● These 3 Cooper-Bessemer JM motor-driven compressors are busy saving dollars month in, month out in one of the nation's biggest ammonia producing plants.

If you wonder where the unusual economy comes in, the answer is quite simple. Because these JM's are exceptionally compact, without sacrificing accessibility or ruggedness, they conserve costly space, require less investment in foundations, piping and over-all installation requirements.

Moreover, it's demonstrated time and again that these modern, compact Cooper-Bessemer compres-

sors retain the long life qualities of the much bigger slow speed units. Naturally this adds up to low upkeep cost on any long range basis you care to name.

If your plans call for motor-powered compressor service, up to 3000 hp, let us give you some interesting facts on the Cooper-Bessemer features ready to save you money year in, year out.

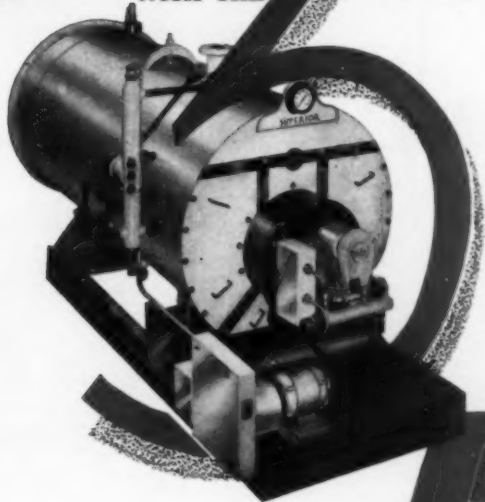
The
Cooper-Bessemer
Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York Washington, D. C. Bradford, Pa. San Francisco Houston, Dallas
Greggton, Pampa and Odessa, Texas Seattle Tulsa Shreveport St. Louis
Los Angeles Chicago Caracas, Venezuela Cooper-Bessemer of Canada, Ltd., Hal-
ifax, Nova Scotia Gloucester, Mass. Calmes Engineering Co., New Orleans, La.

CAPACITY OPERATION *Easily*

WITH THE



Sq. Ft.

OF HEATING SURFACE

PER B.H.P.

IN EVERY

SUPERIOR
STEAM GENERATOR

A good steam generator doesn't have to be pushed . . . it attains its maximum rated capacity with ease. Superior Steam Generators do just this and at thermal efficiencies in excess of 80% under field operating conditions. One of the main factors contributing to their full capacity operation at high efficiencies is the five square feet of heating surface per b.h.p. in every Superior Steam Generator.

High efficiencies developed on the job result in lower fuel costs. These same high efficiencies developed easily without pushing the steam generator result in lower maintenance costs and longer boiler life. The final result of course, is lower steam costs.

There are other features which contribute to the outstanding performance of Superior Steam Gen-

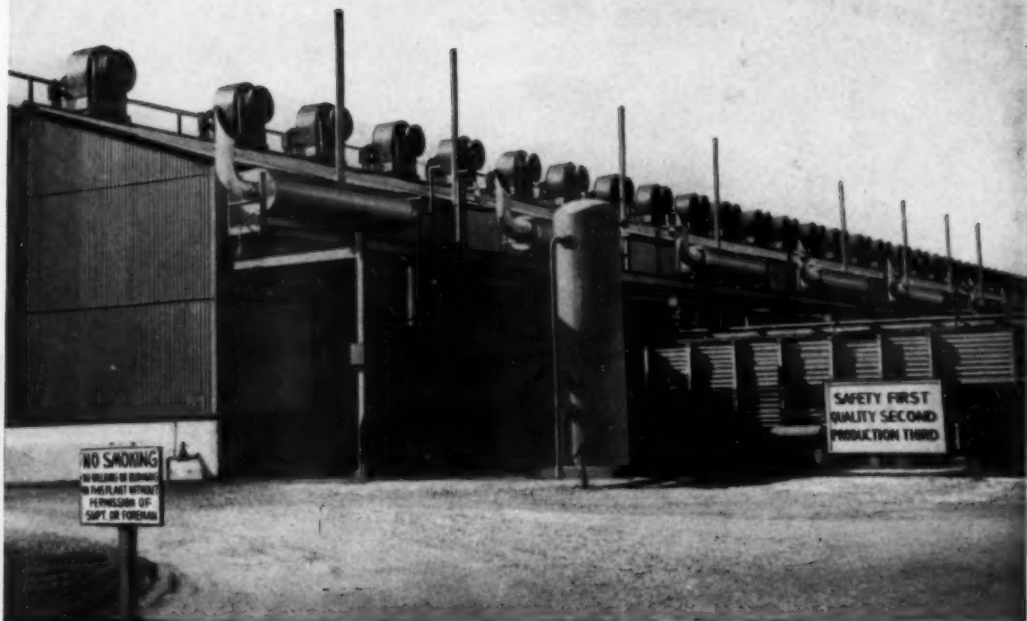
erators . . . multiple-fan induced down-draft which is built-in, combined with Superior 4-pass construction for higher efficiency . . . large evaporating surface for quick steaming . . . large steam space and dry pan to assure ample reserve steam capacity and 99.5% dry steam at the nozzle . . . and many other important features, each painstakingly developed through experience and research, to make a Superior Steam Generator the unit to cut your steam costs.

Superior Steam Generators are completely factory assembled, backed by undivided responsibility. Burn gas or oil, or both. Manufactured in 18 sizes from 20 to 600 b.h.p. for pressures up to 250 p.s.i. or for hot water.

Write today for the details in Catalog 311.

 **Superior Combustion Industries, inc.**
Factory: Emmaus, Pa.
Executive Offices: Times Tower, Times Square, New York 18, N. Y.

PUTTING *Air* TO WORK



28 LUNGS THAT EXHALE AN EXPLOSIVE HAZARD

Every 60 seconds there must be a complete change of air in this building. Reason: to prevent the accumulation of explosive hydrogen, used in manufacturing ammonia. But what could be a dangerous process is made safe in one of the newest synthetic ammonia plants recently built in the Southwest by exhausting air through Sturtevant Elbow Axial Flow fans . . . 28 strong, right down the rooftop.

Strong north winds can't "back pedal" those fans . . . and rain is completely shut out. Motors, bearings and

belts are located outside the air stream, an industry-proven advantage in exhausting corrosive fumes.

To meet the need for efficient fume or vapor removal in your plant—as well as air conditioning, air handling or air cleaning—there is Sturtevant equipment specifically designed to help you put air to work. Contact your local Sturtevant office, or write to Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.

YOU CAN BE SURE...IF IT'S

Westinghouse

PUTTING *Air* TO WORK

J-80209



INDUSTRIAL FANS



AIR CONDITIONING



ELECTRONIC AIR CLEANERS



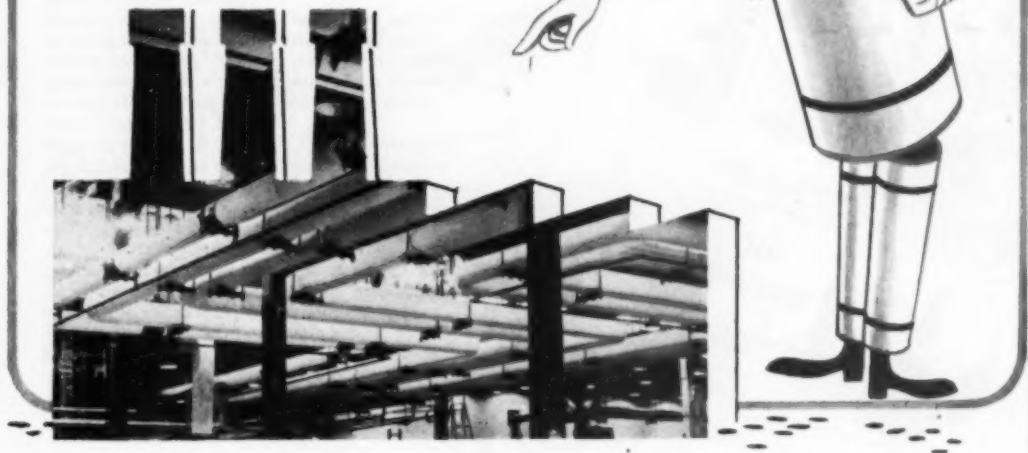
AIR HANDLING APPARATUS



HEATING AND VENTILATING

Mr. Insulation says:

"We haven't found a substitute yet for the right materials, properly applied, to make an insulation investment pay off"



To be successful an insulation job must be properly engineered. In addition, it must have these two important ingredients:

1... THE RIGHT MATERIALS: service conditions vary greatly in industrial applications. That's why no one insulation can serve as a jack-of-all-trades on all jobs. For this reason, Johns-Manville uses asbestos and many other selected raw materials to produce the most complete line of insulations available. These insulations serve applications ranging between the extreme tem-

peratures of 400F below zero to 3000F above.

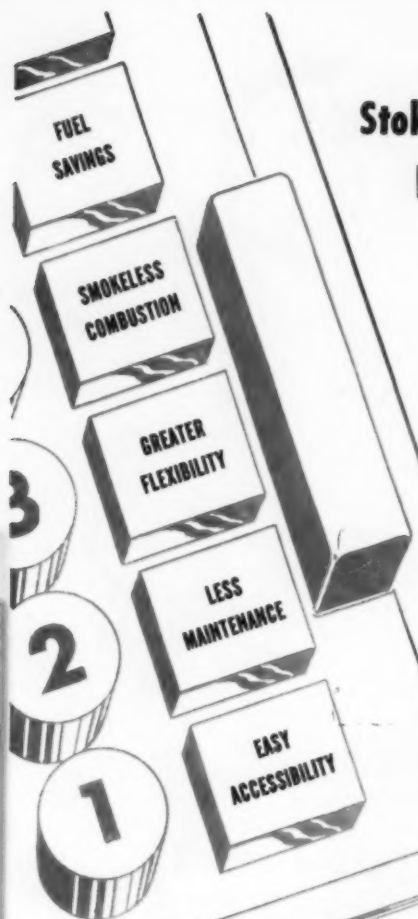
2... THE RIGHT APPLICATION: Here again Johns-Manville's long experience in the field of insulation can be of value to you. Insulation engineering advice plus the services of insulation contractors trained in Johns-Manville methods of correct application are at your call.

If you are planning an insulation job why not put your problem up to insulation headquarters? Write Johns-Manville, Box 290, New York 16, N. Y.



Johns-Manville *first in*

INSULATIONS



Stoker-fired B&W boilers RING UP LOWER STEAM COSTS at National Cash Register

The National Cash Register Company, Dayton, Ohio, had a difficult steam generating problem. Located in the heart of its beautiful factory adjacent to a lovely residential section, its power plant was required to minimize pulverized coal fly-ash and smoke from its stack. To the pulverized coal-fired boiler plant, the company added a B&W stoker-fired boiler of 100,000 lbs.

per hour steam capacity.

The new boiler more than satisfied expectations.

With proper coal it operates at ratings up to 40% overload with complete absence of smoke.

It permits the use of less costly strip-mined coals, which replace coals that deliver in Dayton at almost 50% higher prices.

It operates at high thermal efficiency with quick response over a wide range of loads and fuels, and provides trouble-free service at remarkably low maintenance cost.

On the basis of its performance a duplicate boiler was recently installed.

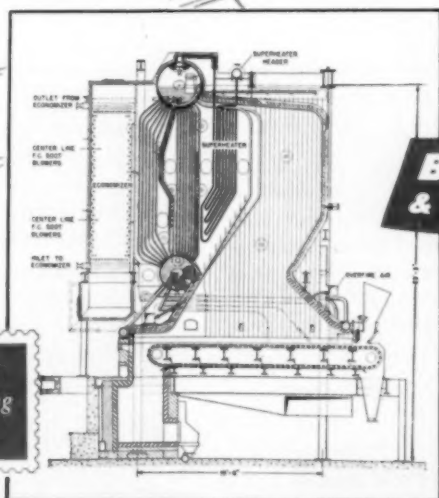
Perhaps you have similar boiler or fuel-burning problems . . . are considering expansion or an entirely new power plant. Why not, like so

many others, get the benefit of B&W's 80-year leadership in design, engineering, and building for steam-generating economies.

The Babcock & Wilcox Co., 85 Liberty Street, New York 6, N. Y.

National

Another Example
of B&W Engineering
for Economy



**BABCOCK
& WILCOX**



G-302

Whatever you need in a Steam Cylinder Oil...

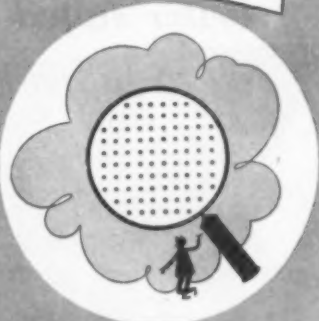
**Sinclair
has it!**



Quick ATOMIZATION



ADHESION to cylinder walls and valves



DISTRIBUTION throughout the steam



RESISTANCE to washing off lubricated surfaces



HIGH TEMPERATURE resistance



Complete SEPARATION from condensate

No matter what your operating conditions—pressure, temperature, quality of steam; speed, loading; condensing or non-condensing—there is a Sinclair Steam Cylinder Oil made expressly to give the utmost in lubrication satisfaction.

Through proper combinations of steam cylinder stocks and compounding ingredients, Sinclair lubrication technologists have developed a series of steam cylinder oils to fit the operating needs of any installation. There are oils that provide quick atomization... persistent adhesion to cylinder walls in the presence of moisture... rugged, wear-resisting lubricating films under super-heat... or complete separation from condensate where that is the dominating requirement.

A Sinclair lubrication engineer will help you select the proper oil for your particular service.

SINCLAIR Steam Cylinder Oils for every steam engine installation

For lubrication counsel see your nearest Supplier of Sinclair Products or write Sinclair Refining Company, 630 Fifth Avenue, New York 20, N. Y.

***"I know of
no savings plan
better suited
to individuals..."***



HAROLD H. SWIFT

Chairman of the Board, Swift & Co., Inc.

"I know of no savings plan better suited to individuals than buying U. S. Government Bonds through the payroll deduction plan. Systematic saving in this manner is an excellent way to produce a backlog of security for future need."

Let's take a look at the Payroll Savings Plan.

Introduced in 1941—and quickly taken up by industry—Payroll Savings offered employed men and women an opportunity to build for individual and national security through systematic savings in *U. S. Defense Bonds*.

During the war years, Americans continued to save—and helped to finance a large part of the cost of the war—by Payroll purchases of *U. S. War Bonds*.

In the post-war period of adjustment, billions of dollars in bonds provided an economic cushion new to this or any nation. Inflation would have been a far more serious problem had these billions of dollars been used for competitive spending.

Since VJ Day, men and women have continued to build security through easy, systematic Payroll purchases of *U. S. Savings Bonds*.

In June 1950, Americans held a total of 56 billion dollars in *U. S. Defense, War and Savings Bonds*, a figure higher than that held on VJ Day. More than 8,000,000 employees, in 21,000 large companies (employing 100 or

more) were saving, month after month, in *U. S. Savings Bonds*.

In November, 1950, thousands of top executives took a look at their Payroll Savings Plans. Then, through a simple person-to-person canvass of their employees they made sure that every man and woman was given a Payroll Savings Application Blank and an opportunity to make his or her own decision. The results would be astonishing to any but Americans. Without pressure or emotional appeal, employee participation jumped from 30%, 40%, to 80% . . . 85% and even higher. More than a million workers have joined the Payroll Plan or increased their monthly investment.

Take a look at your company's Payroll Savings Plan. See that every employee—particularly the newer ones—are given a Payroll Savings Application Blank—and an opportunity to save through monthly investment in *U. S. Defense Bonds*. Phone, or write to *Defense Bonds Division*, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C. Your State Director is ready to help you help your employees and your country.

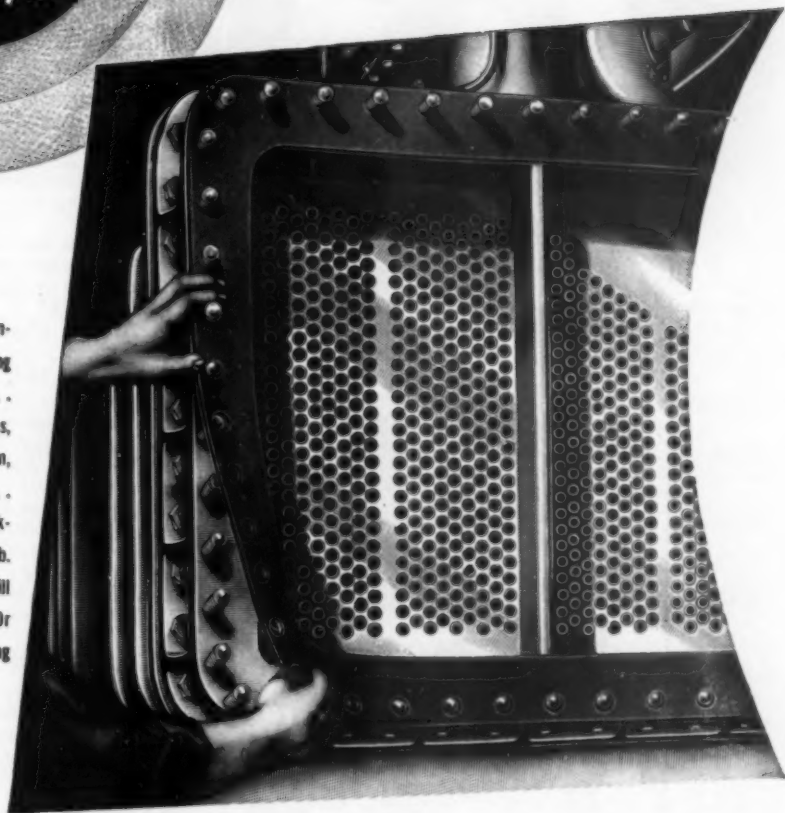
The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

SOUTHERN POWER & INDUSTRY



**IT'S
PACKED WITH
SATISFACTION
WHEN IT'S
PACKED
WITH R/M**

Gaskets like this for Freon condensers may not be your packing problem, but whatever it is . . . high pressures, high temperatures, chemicals, refrigerants, petroleum, food or other products . . . Raybestos-Manhattan has a packing or gasket designed for the job. Your nearby R/M distributor will help you solve your problem. Or write for the new R/M Packing Catalog.



PACKINGS

**RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, MANHEIM, PA.**

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.

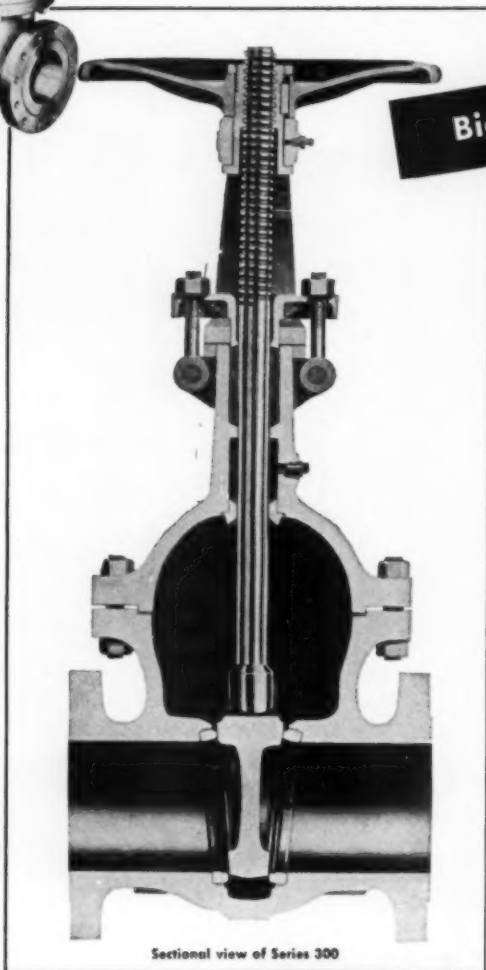
RAYBESTOS-MANHATTAN, INC., Manufacturers of Packings • Asbestos Textiles • Mechanical Rubber Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Powdered Metal Products • Bowling Balls

WALWORTH

Cast Steel Gate Valves

Series 150 and 300

Wedge Gate — Outside Screw and Yoke



Sectional view of Series 300

Big 8-Point Superiority!

Gland clearances are such that stem cannot be scored if gland should be tightened unevenly.

Deep Stuffing Boxes in all sizes (2" to 24") insure tightness and maximum packing life — costly leaks are eliminated.

Bonnets and Bodies are engineered to withstand pressure and minimize distortion — they're tough, durable, dependable.

Heavy Steel Walls provide extra strength and longer life.

Integral Body Guide Rib Faces are machined to insure accurate disc seating.

Seat Rings are bottom seated — not flange type. No recess exists at back of ring — hence no turbulence, erosion, or pressure drop.

Streamlined Ports allow high velocity, non-turbulent flow, and reduce the possibility of erosion.

Valves regularly have flanged ends. They can be supplied with ends for butt welding. Roller bearing yokes are available. On valves 5 inches and larger, by-passes can be furnished.

For Series 600 and higher, we recommend Walworth Pressure-Seal Steel Gate Valves.

For further information on Walworth Cast Steel Gate Valves, see your local Walworth distributor, or write:

WALWORTH
valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

THE EVIDENCE IS OVERWHELMING!

ARMSTRONG TRAPS
GIVE UNEQUALLED RESULTS



NEED FOR NEW BOILER ELIMINATED after installing Armstrong traps on canning equipment ... *Bostovall Canning Co., Vancouver, B. C.*

50% DECREASE IN HEAT-UP TIME of plating coils ... *Proctor Electric Co., Philadelphia, Pa.*

15% GREATER PRODUCTION since unit trapping with Armstrongs ... *Sun Ray Cleaners, Chicago, Ill.*

NO REPAIRS IN SIX YEARS ON 250 Armstrong traps ... *Plymouth Shoe Co., Middleboro, Mass.*

20% FUEL SAVINGS after trapping heating coils individually ... *Norton Greenhouses, St. Paul, Minn.*

SAVING 14 TONS COAL PER MONTH with Armstrong traps ... *M. Wile & Company, Buffalo, N. Y.*

30% LESS MAINTENANCE on traps on low pressure heating system ... *John Deere Harvester Works, East Moline, Ill.*

BETTER QUALITY WORK since trapping laundry equipment with Armstrongs ... *Soft Water Laundry & Cleaners, Long Beach, Cal.*

40° HIGHER TEMPERATURES in flatwork ironer rolls ... *Peter Bent Brigham Hospital, Boston, Mass.*

40 MINUTES FASTER HEAT-UP in drying oven since Armstrong traps were installed ... *Emerson Drug Co., Baltimore, Md.*

DRIER HEAT-UP TIME CUT 2-3 HOURS with six Armstrong traps ... *Industrial Grain Products, Fort Williams, Ontario.*

SAVES 3728 GALLONS FUEL OIL first year Armstrong traps were installed ... *Mary Lincoln Candies, Buffalo, New York.*

YOU CAN confidently expect results like those listed at the left when you install Armstrong-steam traps because:

- No steam loss, hence steam and fuel savings and less return line back pressure.
- Air is vented automatically along with condensate, assuring maximum temperature, less corrosion.
- Valve and seat are chrome steel, hardened, ground and lapped—good for temperatures to 900°F, 950 psig, they last for a long, long time at lower pressures.
- Valve lever assembly and bucket are 18-8 stainless for long wear and corrosion resistance.
- Nothing to stick, clog, leak or collapse.
- Dirt is washed right through by swirling action of the condensate.
- There is almost no friction between moving parts.
- The valve is either wide open or tight closed—no wire-drawing, no dribbling, less wear.
- Condensate is discharged at steam temperature, keeping units at top temperature.

Why have less? Order your Armstrong traps now.

ARMSTRONG MACHINE WORKS
806 Maple Street • Three Rivers, Michigan

SEE OUR
CATALOG
IN SWEETS
OR CEC




SEND FOR THE 36-PAGE STEAM TRAP
BOOK FOR COMPLETE DETAILS

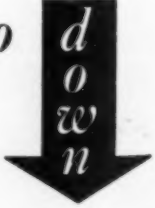


ARMSTRONG STEAM TRAPS

When

HANCOCK

Valves go **in** 

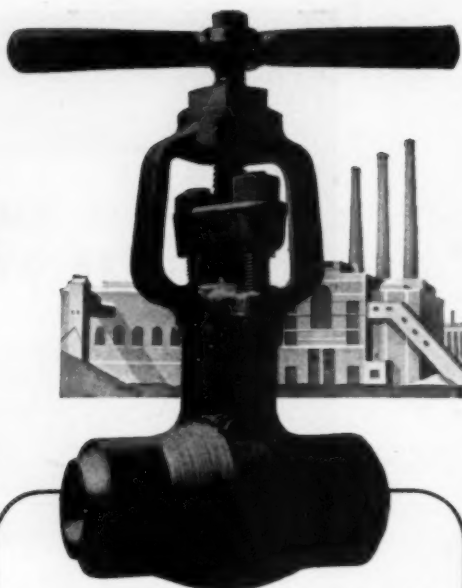
Valve costs go **down** 

HANCOCK 1500# and 2500# WELDVAlVES are "top of the league" for sure, safe, and dependable service. These modern-design valves are the overwhelming choice of design and operating engineers of high-pressure steam plants.

And here are the major reasons: A functional design that positively eliminates leakage at the three spots where most ordinary valves will leak—bonnet joint, gaskets, and seat inserts, seat and disc life that is permanent, lighter valves that also save space yet will stand up in the most severe installations.

Two valve body sizes cover all pipe sizes up to and including 2 inches. Service rating up to 2500#-1050° F., W.S.P. and 6000#-100° F., O.W.G. Sizes from 1/4 inch through 2 inches.

*Install Hancock WELDVAlVES once
for the life of your boiler and lines!*



**HANCOCK 1500# & 2500#
STEEL WELDVAlVES**

2 "Old Pros" on our winning team . . .



No team would be complete without a couple of "old pros"—dependable in action, solid as a line drive, sturdy as the player behind the plate. Hancock 1500# and 2500# Steel Weld-valves are the old "pros" of the Hancock Valve Line-Up.



In service in the majority of high pressure, high temperature power station installations! Here's why . . .

Compensating yoke structure.

Welded bonnet eliminating bonnet flanges and gaskets, means no bonnet leaks.

Integral stellite seats.

Major weight reduction to lessen piping strains. Can be serviced and maintained without removing from line.

Size Simplicity. One size and design for 1/2", 3/4", 1"; a second size covers 1 1/4", 1 1/2", 2".



HANCOCK Valves

A PRODUCT OF
MANNING, MAXWELL & MOORE, INC.
WATERTOWN 72, MASSACHUSETTS



Makers of 'Hancock' Valves, 'Ashcroft' Gauges, 'Consolidated' Safety and Relief Valves, 'American' Industrial and 'Microsen' Electrical Instruments. Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load-Lifter' Hoists and other lifting specialties.

How to **INCREASE BOILER RATINGS**

with your present
furnace and stack

*Coppus-Dennis FANMIX Burners Give You
More Heat with No Other Major Change
in Equipment*

Coppus-Dennis FANMIX Burners give you *perfect* mechanical mixing of fuel and air *at the burner outlet . . . instantaneous* ignition close to the burner . . . and *complete* combustion *without visible flame* when burning natural gas. No other burner combines these three advantages.

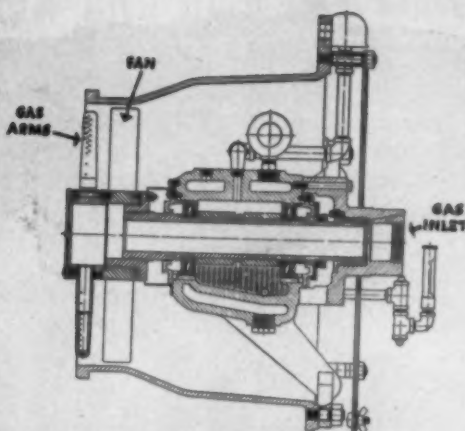
Because FANMIX delivers the *right* mixture of fuel and air *without blow-torch action*, all of your furnace space is used for combustion . . . *none for mixing*. That's why your present furnace can release more heat . . . why new installations can get more heat out of smaller furnace space.

Because FANMIX can be guaranteed to secure complete combustion of natural gas *with less than 5% excess air*, you get uniform "radiant heat" *without drifting hot spots*. That's why a FANMIX-fired furnace seldom varies in temperature more than 5% over its entire area.

WRITE FOR ALL THE FACTS

When you see in Bulletin 410-5 how fuel escaping from orifices in rotating driver arms rotates the fan to draw the correct proportion of air into the path of the fuel at right angles . . . how FANMIX creates its own forced draft, reduces stack requirements, prevents cracking of "wet" gas . . . how two FANMIX types handle either gas or oil or any combination of both—you'll understand why FANMIX Burners have such wide acceptance in oil refineries and power plants.

Send for the Coppus-Dennis FANMIX Bulletin 410-5. Coppus Engineering Corporation, Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, and REFINERY CATALOG.



ANOTHER
COPPUS
"BLUE RIBBON" PRODUCT

COPPUS ENGINEERING CORP.

244 Park Ave., Worcester 2, Mass.

Please send Bulletin 410-5 to:

Name

Company

Address



METAL
WASHER



SOLVENT
STILLS



When you buy steam equipment

*Equipment on which
SARCO
is standard*

WATER HEATERS
•
BOTTLE WASHERS
•
CAP SEALERS
•
DEGREASERS
•
AIR CONDITIONERS
•
SOLVENT STILLS
•
AIR COMPRESSORS
•
OVENS & BOILERS
•
LAUNDRY MACHINERY

Why is it that more than 100 manufacturers of steam operated machinery prefer to equip with Sarco steam traps, temperature controls or strainers before the equipment is shipped? The answer is simple. After years of tests in their plants and in the field they know that their machines will produce more with less steam and fewer service calls.

Isn't that exactly what you want from *all* the steam equipment installed in your plant? If so, all you have to do is to insist on "Sarco Equipped" when you buy new machinery or modernize your present equipment.

A few of the Sarco products supplied with new equipment are illustrated below. For complete information write for Catalog No. 200.



THERMOSTATIC
TRAP



FLOAT
TRAP



BUCKET
TRAP



LIQUID
EXPANSION
TRAP



TEMPERATURE
REGULATOR



STRAINER

SARCO
SAVES STEAM

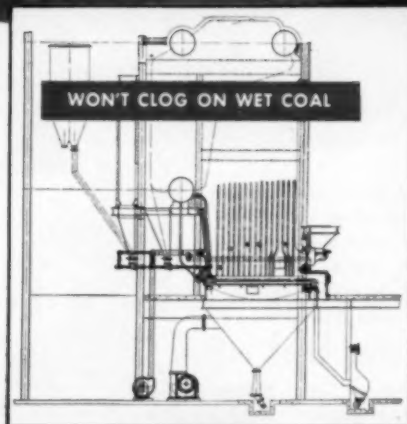
IMPROVES PRODUCT QUALITY AND OUTPUT

SARCO COMPANY, INC.

Represented in Principal Cities
Empire State Building, New York 1, N. Y.
SARCO CANADA, LTD., TORONTO 8, ONTARIO

317

TOP EFFICIENCY FROM LOW AND HIGH ASH COALS PERFECT SPREAD STOKER



Three AE Perfect Spread 2-feeder, travelling grate Stokers recently installed by a leading pharmaceutical manufacturer in the midwest. The boilers, each with a maximum continuous capacity of 60,000 lbs. per hour are Union "A" Type. Efficiency at normal capacity, 83.4%; at maximum capacity, 82.4%. Consulting Engineer, Austin Company.

In the Boiler Room illustrated, the Perfect Spread Stokers were guaranteed to use coal containing either 13,306 B.T.U. or 11,327 B.T.U. per lb. as fired. These two coals have moisture contents of 4.7% and 10.7%, with ash content of 8.2% and 10.1%, respectively. With either coal, practically the same capacity is available but these Perfect Spread Stokers have done even better than predicted. Five different grades of coal have been used to date... and all with top efficiency.

Perfect Spread's unique feeder won't clog on wet coal but feeds uniformly—not in slugs—regardless of moisture content. Its engineered cinder return and adjustable overfire air system give comparable results from either low or high ash coals. Its even feed characteristic insures higher CO_2 , freedom from smoke puffs, minimum carbon in the ashpit, and less fly ash. Feeders adjustable from 50 to 7,500 lbs. of coal per hour... capacities range from 8,000 to 500,000 lbs. of steam per hour. Mail coupon today for full data.



**AMERICAN ENGINEERING
COMPANY**

PHILADELPHIA 25, PENNA.

AE Products are: Taylor and Perfect Spread Stokers,
Marine Deck Auxiliaries, Hele-Shaw and Hydramite
Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers

American Engineering Company
2421 Aramingo Ave., Philadelphia 25, Pa.

Gentlemen: We are interested in saving fuel dollars. Kindly
send booklet giving full information about Perfect Spread
Stokers.

Name Title

Company

Address

City..... Zone..... State.....

"DURACUT
ABRASIVE DISCS
ARE
TERRIFIC!*" 

*This is typical of what hundreds of weld grinders and maintenance men are saying about these new flexible abrasive discs.

For use on portable disc sanders, DuraCut abrasive discs are 1/8" thick while the ordinary coated discs have but a single layer of abrasive. The extra cutting ability offers these startling advantages:

- Greater economy.
- Longer life — 15 to 20 times.
- Faster, sustained rate of cut.
- Safe — strong — resist tearing.
- Increased labor savings — less disc changing.
- Available in a wide range of grits, grades and structures — permit control over rate of cut and finish.

TYPICAL APPLICATIONS: Blending and finishing of steel, stainless and alloy steel welds . . . Removing rust and scale . . . Finishing sheet metal jobs . . . Cleaning weld spatters.

**BAY
STATE**

Order Today for a Trial.

Sizes available for immediate shipment . . .
 $7 \times \frac{1}{8} \times \frac{7}{8}$ } In any of these
 $9 \times \frac{1}{8} \times \frac{7}{8}$ } grit sizes: 36, 54, 80

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh

Distributors — All principal Cities

In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario

Top Performance Consistently Duplicated



Minimum Span, Oversize Casing Studs
 Proof against cutting between stages depends on uniform pressure on gasket. On Warren TH Pumps, extra heavy bolting is especially close to channel rings and bolts are spaced and oversized to provide uniform pressure and lock flanges together for maximum strength. (Inner bolts 1½", outer bolts 1½")

Locked Channel and Case Rings . . .
 Inter-stage seals or channel rings are not only wide to reduce by-passing between stages to minimum, but to make it possible to place casing bolts close to rings for maximum and uniform pressure on gasket. Double flange in lower half and single flange in upper half assures secure locking of channel and casing rings.

Genuine Kingsbury Thrust Bearing
 Made by Kingsbury Machine Works, not modified type of other make. Oil cooled, heavy duty, duplex ball thrust bearing available and practical for discharge pressures 800 p. s. i. and lower.

"Undercover" Facts -

why WARREN six stage, type TH high pressure boiler feed pumps are a most dependable investment.....

There are many other important factors designed to provide a sound investment over the years. Evaluate the benefits and contact Warren on your next high pressure boiler feed job. Write for Bulletin 244 giving further details.

P-28

Trouble-Free Solid Discharge Nozzle
 Discharge nozzle is flared and extra heavy, with studs, instead of the conventional flanged type nozzle, thus eliminating danger of breakage.

Extra Heavy Casing Flanges
 To provide freedom from warping, casing flanges are not only extra heavy, but each bolting point is backed up with heavy boss, providing highest possible strength.

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC., WARREN MASSACHUSETTS

CHAPMAN

Steel Valves

Score on all 3 Points

1

CHAPMAN STEEL VALVES
have the high precision
ratings of custom-made valves
— but the economy of pro-
duction-line manufacture.

2

CHAPMAN STEEL VALVES
are made exclusively from
quality-controlled steels de-
veloped and produced in
Chapman's own foundries
under control of Chapman's
own outstanding metal-
lurgists.

3

CHAPMAN STEEL VALVES
are designed to equal or
surpass — A.S.A. and
A.P.I. Standards in all
pressures and
temperature
ranges.



Be sure to see Chapman first whenever
you need steel valves — gate, globe,
angle or check. As a result of Chapman's long years of
research and experience, they are tops in every respect.



The Chapman Valve
MANUFACTURING COMPANY
INDIAN ORCHARD, MASS.

Timely Comments

Products From Southern Research

THE AVAILABILITY of 32 new products, processes and techniques for licensing has been announced by the Institute of Inventive Research, a nonprofit scientific foundation in San Antonio, Texas. The organization is affiliated with the Southwest Research Institute, one of 38 important research groups of the South and Southwest.

The new Institute bulletin lists inventions patented, developed or subjected to rigorous testing by the Institute's staff, which has approved them for licensing to business firms in accordance with its standard practice. Mr. Reece Hatchitt, Institute market analyst, states that a limited number of the printed bulletins are available upon request.

Some of the products and processes mentioned in the new report are: a butane burning device involving use of LPG hydrocarbons by an ingenious valving arrangement; a capsulating and palletizing process, which is an economical technique for making liquids into "solid" pellets; new motor design for rapid start and stop characteristics; an a-c motor with complete speed control and almost instant reversibility; and a new dynamic balancing machine.

Also included are a reflux classifier for separation of fragmented materials; an electric measuring device; a pneumatic hydraulic compensator; a lead-free vitreous enamel; method for electro-deposition of aluminum; a permanent threadless pipe joint; and a nonrestricting fluid check valve.

Cut Handling Inefficiency

AN ESTIMATED 625 million man hours can be added to the nation's production capacity within 1951 if industrial plants make full use of modern storage and distribution techniques. In addition, shipping facilities can be used at least 15 per cent more effectively, according to Lawrence J. Kline, general manager of the Automatic Transportation Company.

Technological advances of recent years offer advantages for producers of almost any size, whether their plants are new or old. In the huge production effort of World War II, vital problems were manpower, box-car and warehouse space shortages.

Obsolete ways of handling materials and merchandise use too much manpower and add considerably to the price of the finished product. Manual handling means slower loading and unloading of box cars and highway trucks, requiring more trucks and freight cars for the job.

Third Time In Twenty Years

THE FOLLOWING excerpts are from one of the many pungent advertisements written by President H. H. Harris, of General Alloys Company of Boston, manufacturer of heat and corrosion resistant castings. His copy appears monthly in *Metal Progress*, official publication of the American Society for Metals.

SNAFUSIS—The Nation ARMS again—and the SNAFUSIS of Bureaucracy spreads once more upon us. We of industry will expend much time and energy milling with muddled meddlers as we matriculate in red tape. Fewer New Deal "Professors" this time, we are told, will guide us. Maybe, repeat maybe the ACADEMICONSTIFUSION will be a few decibels lower.

There are many able and sincere men in the National Production Authority fighting for just and rational procedures. They need and deserve industrial support.

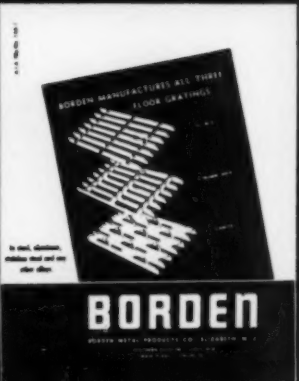
IMMATURITY—America has long had a mass idealism, a National naivete unequalled in history. This, strangely, has been superimposed upon, almost obscuring our deep heritage of common sense, residing at all levels of society—even including the parasitic. The public is undoubtedly thinking straighter than our leadership. Even the yokels have lost patience with the diplomats.

It is dawning slowly that all of us share the immaturity of the human race, which is morally and intellectually unready to participate in the Communion of nations—and dwell in Peace. That, it appears, is historically and currently obvious.

FUNCTIONAL PROMISE—Whatever our spiritual and philosophical limitations and our disillusionment with politics, history records that the inventive genius of man and his increased productive capacity has been the motive power of human progress.

The Engineering Sciences are the true sciences. They progress geometrically, whereas the social and political pseudo-sciences progress arithmetically. This nation was never stronger in its power of invention, development, and, above all, production.

In the interval between wars, our Armed Services have made major contributions in research and development for defense (and industry) which, when weighed against all efforts of Government, are, perhaps, the greatest value that the taxpayer has received for his dollar.



BORDEN GUARANTEES ALL THESE FEATURES . . .

1. **Safe load capacity**
Proven grating and floor armor in Borden's testing plant, under actual conditions of service.

How to specify or order Borden Floor Gratings
Borden's planning and checking service

Borden manufactures all

Borden Steel Safety Steps

1. **Standard type**
2. **For stairs**
3. **For ladders**
4. **For platforms**
5. **For roofs**

3 types of Floor Gratings

Borden Steel Floor Armor

1. **Standard type**
2. **For stairs**
3. **For ladders**
4. **For platforms**
5. **For roofs**

BORDEN METAL PRODUCTS CO.
ONE BORDEN LANE, ELIZABETH, N. J.

SEND FOR NEW FREE CATALOG

Contains technical information on how to select, design, purchase and install Floor Gratings, Safety Steps, Floor Armor

HERE ARE SOME OF THE FEATURES OF THE CATALOG:

1. A survey of the three main types of floor gratings and their special adaptations. Tells particular features of each grating. Covers applications for which each type of grating was designed.
2. What features to look for when buying gratings and safety steps.
3. Safeload tables adopted by U. S. Government:

Bearing sizes

Spans

Weight per square foot

Panel widths, etc.
4. Step-by-step procedure for ordering, planning and checking to insure the right grating for each job.
5. Safety steps and floor armor — discusses separately the same general categories covered under floor gratings, with tables, etc.

BORDEN METAL PRODUCTS CO. SPI
Green Lane, Elizabeth, N. J.

Gentlemen:

Please send me Borden Catalog No. AT-251.

name _____

company name _____

street and no. _____

city and state _____

BORDEN METAL PRODUCTS CO.,
ELIZABETH, N. J.

SOUTHERN DIVISION — LEEDS, ALA
MAIN PLANT — UNION, N. J.

Industry Speaks

Current Picture of Southern Economy

The South's natural and human resources and their potentialities for helping out in the present national emergency were discussed at a Washington news conference on March 6th by representatives of the Committee of the South of the National Planning Association.

Comments were based on the 460 page "Economic Resources and Policies of the South" published by The MacMillan Company which is the result of approximately three years' work by Calvin B. Hoover, Chairman of the Department of Economics of Duke University and his colleague at Duke, B. U. Ratchford.

THE necessary background for analysis of agricultural price and production policies, industrial location policies, wage and labor policies, as well as policy in the utilization of manpower, are set forth in convenient form for use by planners in industry, agriculture, labor and government. Several highlights of "Economic Resources and Policies of the South" are as follows:

General—survey or inventory of resources and analysis of trends in their use for past 20 years . . . considerable tabular and statistical material . . . total of 96 tables and 12 charts present reference material on basic economic characteristics and behavior of region.

Physical Resources—with intelligent use of existing assets and full exploitation of natural resources, South should be able to bring its income more nearly up to national average.

Population—Does not grow quite as rapidly in South as in U. S. as a whole due to heavy migration out of South . . . Negroes have migrated in larger numbers than whites . . . heavy rural population and low level of education are important factors explaining low income in region . . . while South lost in numbers through interstate migration there are indications that it gained in the higher educated brackets than it lost.

Income—Movements of income in South traced for past 20 years . . . agriculture declining in importance as source of income . . . manufacturing rising . . . cotton now accounts for a distinctly minor part of region's income, probably not more than 6 per cent.

Barriers to Development—Three factors are still acting as barriers: lack of managerial training and initiative, late start in industrialization, and unfavorable "terms of trade."

Agriculture—Four chapters of book deal with recent developments, agricultural policy, cotton and tobacco . . . controls and price supports in long run will not be most beneficial to southern agriculture . . . instead, higher income for farmers must depend on higher productivity per worker.

Industrial Development—South has made progress in industrial field both absolutely and in relation to country . . . composition of Southern industry is changing considerably . . . cotton textile industry growing but at considerably slower rate than rest of industries . . . greatest growth in industries which pay high wages—paper and chemicals . . . disfavor of highly specialized promotion methods, such as subsidies and tax exemptions to further industrial development . . . authors recommend measures that will create favorable general environment for industry . . . these include honest, efficient government; water and electric power; sound, fair tax system; industrial development corporations; more technical training and research; good highway facilities; and avoidance of trade barriers.

Labor and Wage Policy—Southern labor generally as productive as labor in other parts of country . . . lower wages in South not major inducement in attracting industry to region.

Financial Resources—South's growth has been faster than in other areas of country during past 20 years . . . country's insurance companies have been investing in Southern industries and utilities at increasing rate.

International Trade—Growth of Southern industry and great increase in domestic consumption in U. S. and declining foreign markets for cotton and tobacco, have greatly reduced the southern dependence on foreign trade . . . South does not have any greater specialized interest in foreign trade than other parts of country.

Throughout the book the authors stress the need for further research and study of the South's problems. Because of the broad scope of their study it was not possible to give exhaustive treatment to all the different fields. The main purpose was to describe the over-all characteristics of the regional economy, to analyze its major problems and to suggest general policies for their solution. By its very nature, the book provides a starting point for more detailed investigations of the subjects it covers.

Georgia

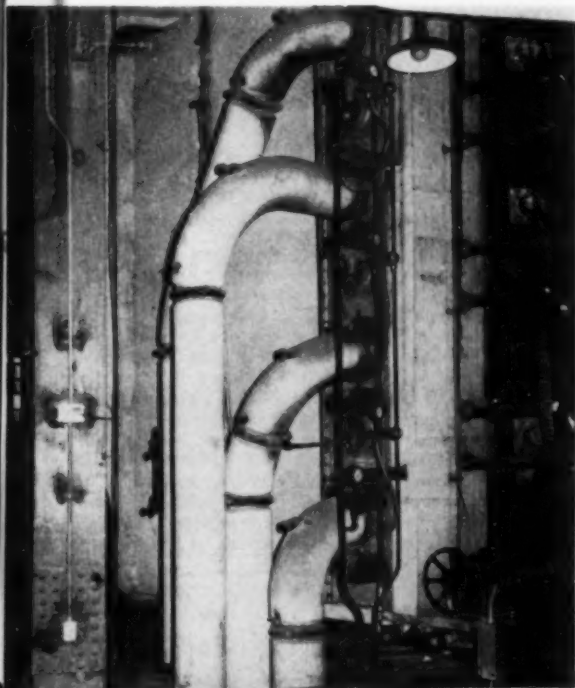


Above — Coal handling equipment. Power house is at left and coal storage at extreme right. The crusher house is at center, with the cantilever belt conveyor extending over the coal pile. The long belt conveyor delivers to a distribution belt and tripper located over the bunkers in the power house.

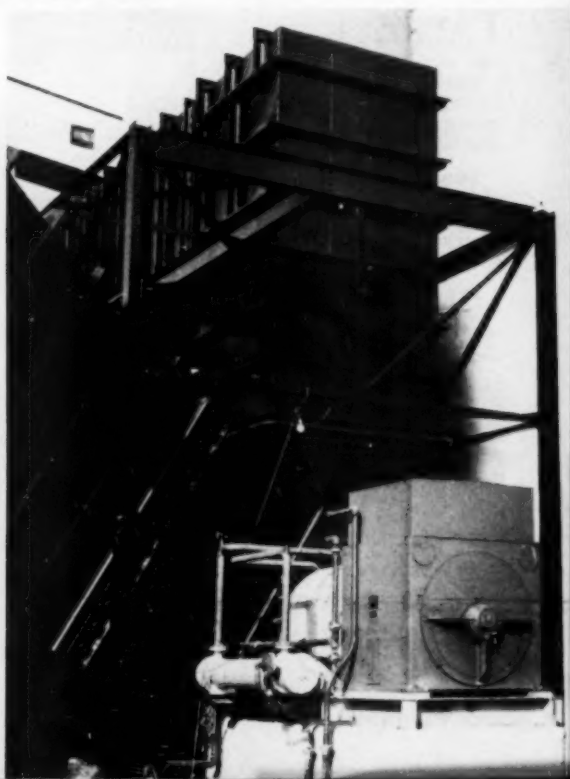


Left—Front of power house seen from river side. Offices, shops, laboratories, and wash rooms are in the two story brick section at right.

Below—Corner of boiler showing location of burners. Pulverized coal hot air mixture goes through pipes in foreground. Burner-tilt drive is at lower right.



Below—The induced draft fan is located outside the building, near the stack. The drive motor in the foreground is water cooled. The hydraulic coupling and its oil cooler can be seen behind the motor.



Power Company—Plant Yates

By **FRANK M. STEWART**

Results Engineer

Long range planning and a rapid construction program bring Georgia 200,000 kw additional capacity to help meet stepped-up defense production needs.

PLANT YATES, newest generating station of Georgia Power Company, is located near Newnan, Georgia, on the Chattahoochee River. Its first 100,000 kw unit started operation in September, 1950, the second began operation in November, 1950, and installation of a third was started in November, 1950. Planned ultimate capacity for the station is four 100,000 kw units.

Turbine Generators

Each turbine is supplied with steam by its own boiler, and there is no tie between the boilers. At present, the boilers are fired with coal but all facilities have been provided for use of natural gas, when available.

Electricity is generated at 13,800 volts and is stepped up to 110,000 volts for transmission on four Georgia Power Company system lines, and one other line provides a direct tie with Alabama Power

Company. The generators connect direct to the transformers, without intervening generator breakers, but oil breakers are provided on the high side of the 13,800/110,000 volt single phase transformers.

The two, 21 stage turbines are supplied with 1250 psi, 950 F, steam at full load, and exhaust into surface condensers. Steam is extracted from the 5th, 9th, 16th, and 18th stages for feedwater heating and deaeration.

The voltage of each generator is controlled by an amplidyne motor-generator which requires no pilot exciter. The generators are cooled by hydrogen at $\frac{1}{2}$ to 15 psi, as required by load conditions.

Condensers

The Chattahoochee River supplies cooling water, and an adequate supply is available for requirements of the planned ultimate capacity of 400,000 kw.

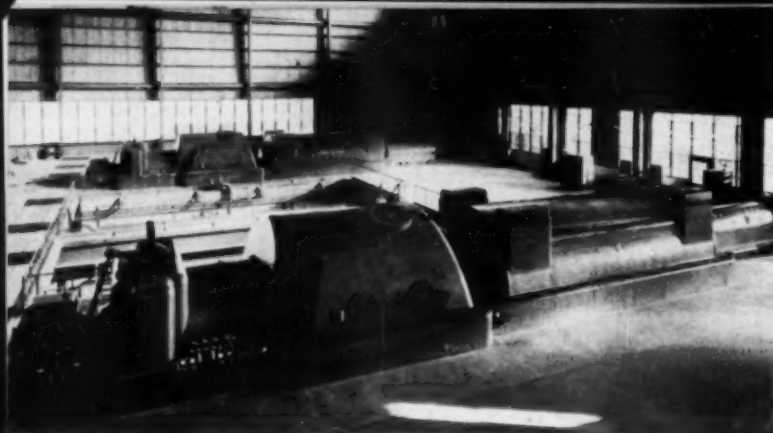
Condenser cooling water is taken from the intake tunnel, which runs underneath the base slab, by two vertical circulating water pumps located adjacent to each condenser. This water is returned to the river through a discharge tunnel downstream from the intake. Condensate is pumped from the condenser hot wells by one of two condensate pumps per unit and discharged through the inter and after condensers to the extraction feedwater heaters.

A particularly advantageous feature of the condenser design is provision of two four-way reversing valves on each condenser, which permit reversal of the cooling water flow through the tubes. When reduced vacuum indicates that trash and debris have accumulated on the tube ends, the valves are reversed, and the backwash water movement removes the trash. Since each condenser is composed of two identical halves, this

Right—Coal pulverizers. Hot air ducts supply primary air for combustion as well as drying.

Below—The forced draft fan-housing is seen at right. The drive motor is at left, and hydraulic couplings in center. Recirculating air duct, above, takes hot air from pre-heater outlet and delivers to the fan inlet, to raise temperature and prevent condensation.





General view of the turbine room showing No. 1 unit in the foreground.

reversal of flow in one-half at a time is accomplished without excessive loss of vacuum.

Boilers and Auxiliaries

The boilers and their auxiliary equipment are located within the power plant building, except the induced draft fans and cyclone type precipitators, which are located out-of-doors. Each boiler has two forced and induced draft fans, two precipitators, two air preheaters and a split economizer. Superheated steam from each boiler flows through two 10 inch lines to the turbine stop valve.

Furnace burners are located at the four corners and they fire pulverized coal, natural gas and fuel oil for lighting. These burners are tilted vertically by drive motors to control superheat temperature and are actuated by a change in this temperature.

The boiler and turbine controls are housed in a glassed-in enclosure located on the main operating floor, between the turbines and the boilers. Control panels for No. 1 unit face those of No. 2. Boiler controls are automatic and the furnace draft is controlled through increase-decrease valves on the I.D. fan hydraulic couplings. A similar control provided on the forced draft fans for air flow control is actuated by air flow and steam flow. All controls can be operated automatically or by manual loading from the panel board.

Boiler Feedwater

Boiler feedwater makeup is also from the river. At present this raw water goes directly to the evaporators, but a clarifier is being installed for removal of solids and will be placed in operation in the near future. There is no external

boiler feed treatment, but chemicals are added in the boiler drum to control oxygen, pH, and hardness.

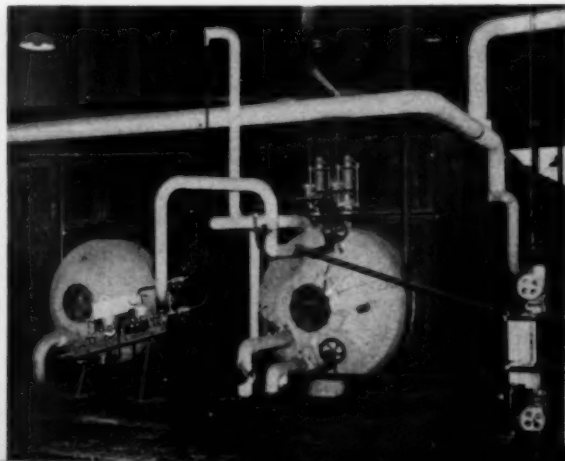
Each boiler is fed by three 9-stage, double-case pumps. Each pump, driven by a constant-speed motor through a hydraulic coupling with scoop-type speed controller, has a capacity of 578,000 pounds per hour at 317 F. All pumps are designed for variable-speed operation down to a minimum allowable flow of 110,000 pounds per hour. Discharge pressure at full load speed of 3470 rpm is 1750 psi. Two pumps are normally in service, the third on standby. The feed control system, however, provides for automatic or manual operation of any combination of the pumps. Normally feedwater control is obtained solely from the control of pump speed, but a feedwater regulator valve is also provided.

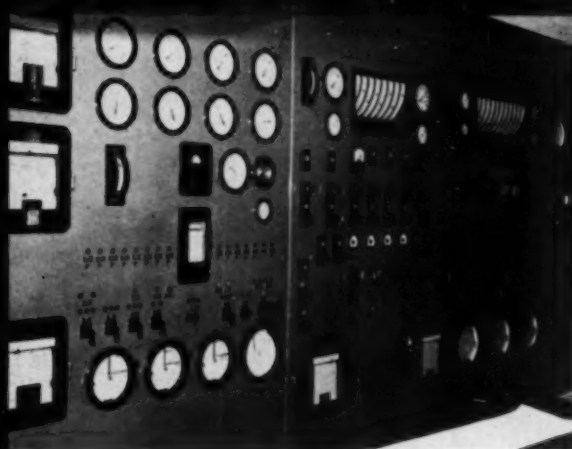
Normally air impulses pass through the panel for each pump in service, to be received by a diaphragm on the control unit which acts on the coupling through the scoop controller to vary pump speed according to load and level requirements. Manual control from the panel is also possible. Minimum flow control protects pumps against overheating on light loads.

Coal and Ash Handling

Coal in hopper bottom cars is brought from a railroad siding, by dinky, to a car shakeout, where it is dumped into a reciprocating feeder, which places the coal on a

At left is a general view of equipment on the heater floor seen from between the condensers, with the vertical feedwater heaters clearly shown. At the right is a view of boiler drum showing feedwater regulator, safety valves; and the level indicator at extreme right.





The view at left shows the controls for one unit with the turbine panel on left and the generator panel on right. These controls are mounted in an enclosed structure on the turbine floor. A duplicate set of controls (out of view) faces the one shown here, and serves the other unit. The illustration at right shows the 2-pass, divided water box condenser with vertical circulating pumps on each side.

conveyor belt at a uniform rate. The conveyor belt transports the coal over a magnetic pulley, for tramp iron removal, to a crusher and then either to the power plant building or to the coal pile. Coal on the pile is packed and moved by bulldozer and is returned to the conveyor via a reclaim hopper.

Coal which enters the building is distributed to bunkers by a belt tripper. Pulverized coal, at this time, is the primary fuel and is taken from the bunkers in a crushed condition, through the coal scales to the feeders and then to the bowl mill pulverizers. The rate of coal feed is controlled from a "master," which maintains a nearly constant superheater outlet pressure, by po-

sition changes of a feed rate lever on the feeders.

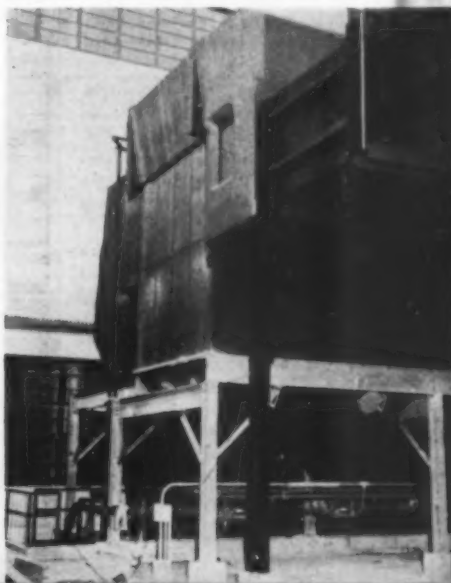
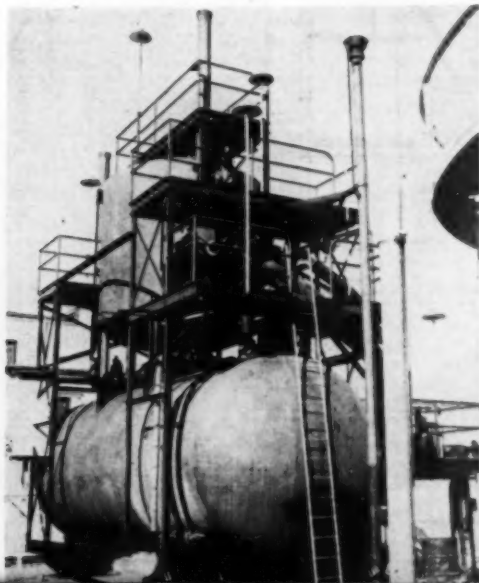
Ashes are sluiced from the furnace bottom to a sump where one of the two ash disposal pumps takes over and delivers these ashes, plus ashes collected by the precipitator from the flue gas, to a settling pond where they are deposited.

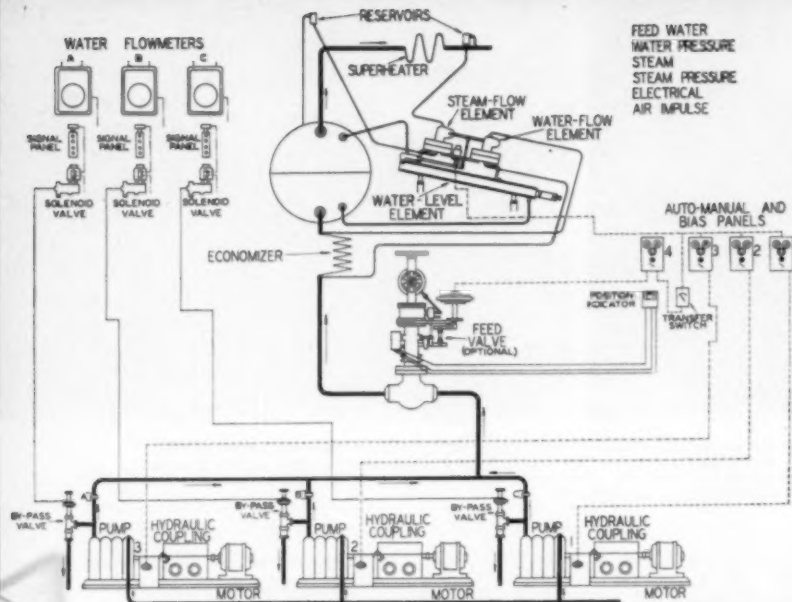
Electrical Equipment

A switchboard room houses the generator control and switchboard panels. The electrical panels for each unit are located side by side and include the usual meters,

switches and relays. Switches and instruments for the switchyard are also located on panels in this room. The switchyard has three 110,000 volt buses to which the five transmission lines are connected—one bus for each unit and a transfer bus. An auxiliary transformer (110,000 to 2,400 volt) is connected to the transfer bus, and station service electricity can be furnished through it to the plant in case the power units are out of service. Usually, however, station service is taken from one of the generator output buses through a 13,800 to 2,400 volt transformer.

The deaerator is on the plant roof. The storage tank is below the deaerator, and controls are above the platform. The fly ash precipitators are located outside the building. Ducts, above right, lead to the induced draft fan.





The Copes Balanced Flow Control for each boiler is responsive to steam flow, feed flow and water level. Air impulses position the individual controller for the hydraulic coupling of each motor driven pump. The feed valve is normally wide open, but can be cut into automatic service at any time. Minimum flow control protects the pumps against overheating on light loads.

Sectional View of Boiler

Auxiliary transformers furnish voltage for station service at 2,400 volts, 575 volts, 208 volts and 110 volts.

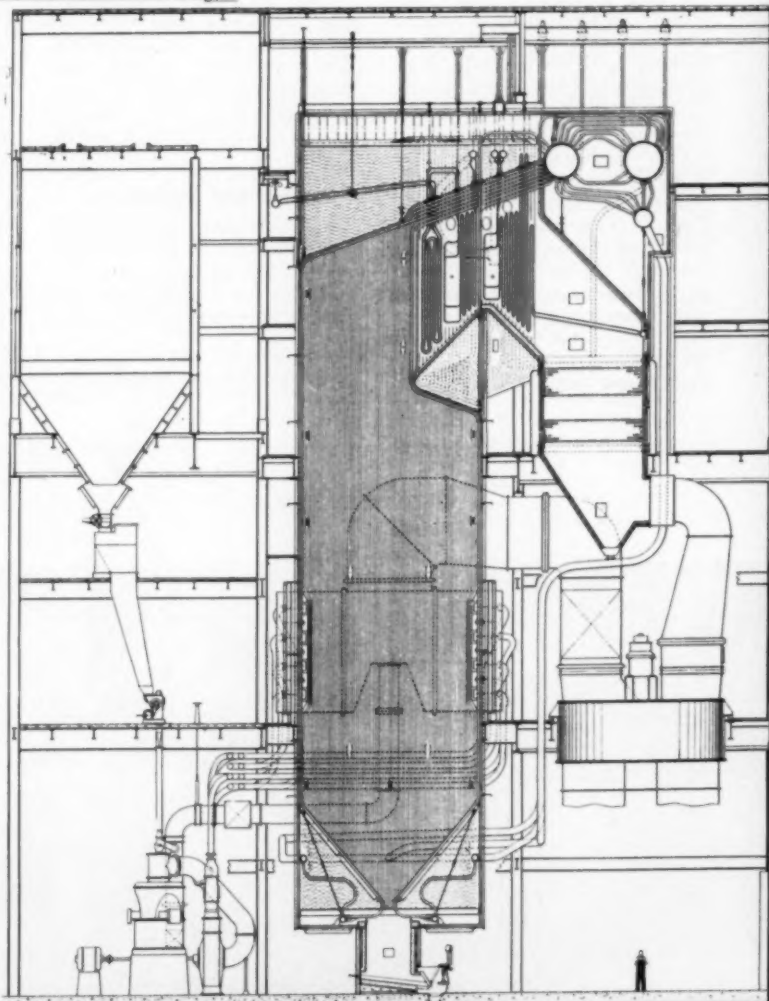
Fire Protection

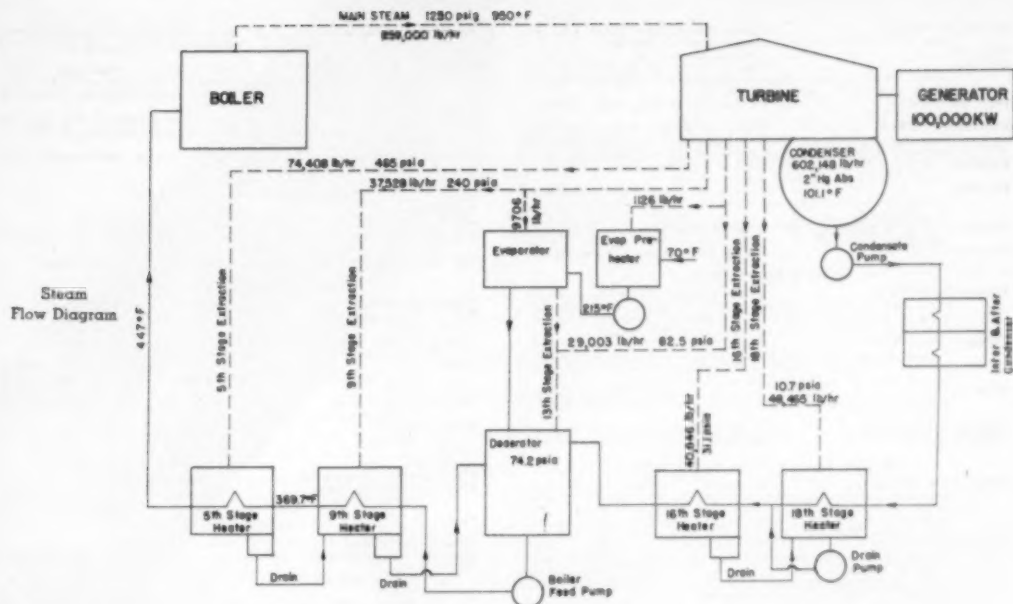
With the exception of improved circuit breaker protection, fire prevention facilities are similar to those in other recent company stations. Plant Yates, however, is the first of Georgia Power Company's installations to provide CO₂ protection for circuit breakers and buses. The arrangement here is in keeping with recommendations of A. H. Mergenthaler in "Fire Protection for Generating Stations," which appeared in *SOUTHERN POWER AND INDUSTRY*, December, 1950.

Fire protection for each switchgear cubicle of units 1 and 2 and essential buses is provided by nozzles which discharge carbon dioxide into all compartments in case of fire. Operation of the CO₂ valves is manual.

The switchgear cubicles for the coal handling equipment (housed separately and non-attended) are protected by a thermostat actuated, automatic control, CO₂ system. This system can, if necessary, be manually operated.

In addition to the above fixed piping system, hose reels are conveniently located so that CO₂ can





be directed into the cubicles as desired.

Building and Facilities

The main building is of steel and reinforced concrete and has a light grey transite siding. Office space for the plant superintendent, supervisors and office personnel is located in the front of the building, which overlooks the Chattahoochee River.

Also located in the front part of

the building are the well equipped laboratory, machine shop, assembly room and modern locker-shower rooms.

The largest part of the building houses the boiler firing floor and turbine-generator floor on the same elevation, with no division wall between boilers and turbines. The deaerators and house service water tank are located on the roof.

Performance

Results and performance so far have met expectations, and experiences in correcting initial operational difficulties have not been excessive or unusual. The units became available at a time when system demands were high, therefore the new units have been operated at high load factor—which condition they have met with excellent performance.

PRINCIPAL EQUIPMENT—Plant Yates, Georgia Power Company, Newnan, Georgia

GENERAL DATA

Name of Station	Plant Yates
Station Site	Between Newnan and Carrollton, Georgia
Total Generating Capacity	200,000 kw present, 400,000 ultimate
Total Boiler Capacity	1,950,000 lb per hr.
Steam Conditions	1250 psig, 950 F at turbine throttle
Cooling Water Source	Chattahoochee River
Design Engineers	Southern Services, Inc.

TURBINE-GENERATORS

Turbines	Two—General Electric Company, 100,000 kw, 3,600 rpm.
Generators	Two—General Electric Company, 100,000 kw, 111,111 kva, 4,650 amp, 13,800 volts, 3 phase, direct connected.
Exciters	Two—General Electric Company, 375 volts, 310 kw, 1191 rpm, connected to generator through speed reduction gear.
Generator Coolers	Finned armoured admiralty tubed hydrogen coolers within the stator frame. Cooling surface—11,750 sq ft per generator.
Turbine Oil Coolers	Twin oil coolers, tubular, with 560 sq ft cooling surface each, are installed in the reservoir.
Turbine Oil Filters	Two—Bower, Inc., capacity 340-1000 gph.

CONDENSING EQUIPMENT

Condensers	Two—Foster Wheeler Corporation, two pass, cooling surface 82,500 sq ft. Reversible flow.
Circulating Pumps	Four—Foster Wheeler Corporation, vertical, 43,250 gpm each; Drive—Westinghouse Electric Corporation induction motor, 450 hp, 2,300 volt, 103 amp, 3 phase, 595 rpm.
Condensate Pumps	Four—Foster Wheeler Corporation, 3 stage, 1,600 gpm. Drive—Westinghouse Electric Corporation induction motor, 250 hp, 2,300 volt, 157 amp, 3 phase, 1,180 rpm.

Air Removal Equipment	Two—Foster Wheeler Corporation, steam jet inter and after condenser.
Expansion Joints	Henry Pratt Co., Inc., condenser cooling water rubber expansion joints. Badger Mfg. Co. condensate pump suction copper expansion joints.

SWITCHBOARD EQUIPMENT

Switchboard and Control Panels	Assembled and wired by Georgia Power Co. Instruments, voltmeters, ammeters, synchroscope, relays and voltage regulator by General Electric Company, Frequency meter by Esterline Angus Co., Inc. Station load indicator by Leeds & Northrup Co.
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STEAM GENERATING EQUIPMENT

Boilers	Two—Combustion Engineering—Superheater, Inc., 2 drum radiant type with water wall furnace; heating surface of boiler and walls 48,900 sq ft; heating surface of superheater 36,200 sq ft; capacity 975,000 lb per hr each, pressure at superheater outlet; design—1325 psi, operating—1300 psig, 950F.
Economizers	Pin tube split type with 35,700 sq ft heating surface each.
Air Heaters	Four—The Air Preheater Corporation, Ljungstrom regenerative with 138,000 sq ft heating surface each.
Soot Blowers	Diamond Power Specialty Corporation—steam blow, air operated and controlled.
Blow-Off Valves	Continuous—Hancock; Manning, Maxwell & Moore, Boiler—Yarrow; Tarnall-Waring Co.
Water Columns	Diamond bicolor gauge, Reliance Electric & Engineering Co. vertical water columns, Eye-High, panel mounted.
Safety Valves	Foster Engineering Co.
Chemical Feed Pumps	% Proportioners, Inc.; Worthington Pump & Machinery Corp.

COAL HANDLING EQUIPMENT

Coal Conveyors	Continental Gin Co., 48" belt, 800 tons per hr.
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Automatic Scales Eight—Richardson Scale Co., 40 tons per hr each, weight hopper capacity 500 lb.
Vibrators Centron Electric Co.
Crushers Two—American Pulverizer Co.
 Drive—Westinghouse Electric Corporation induction motor; 250 hp, 2300 volt, 59.6 amp, 576 rpm.
Coal Shakerout Robins Conveyors, Div. Hewitt-Robins, Inc.
Pulverizing Mills Eight—Raymond Bowl Mills. Capacity 21,000 lb per hr each. Drive—Westinghouse Electric Corporation motor; 350 hp, 2300 volt, 78 amp, 867 rpm.
Feeders Eight—Raymond Bowl Mills feeders with built-in variable speed control.
Burners Sixteen—vertically adjustable tangential pulverized coal burners. 32 gas firing nozzles, 12 oil burners.
Superheat Temperature Controls Leeds & Northrup Co., automatic changing burner tilt.
Combustion Controls Hagan Corporation, air operated.

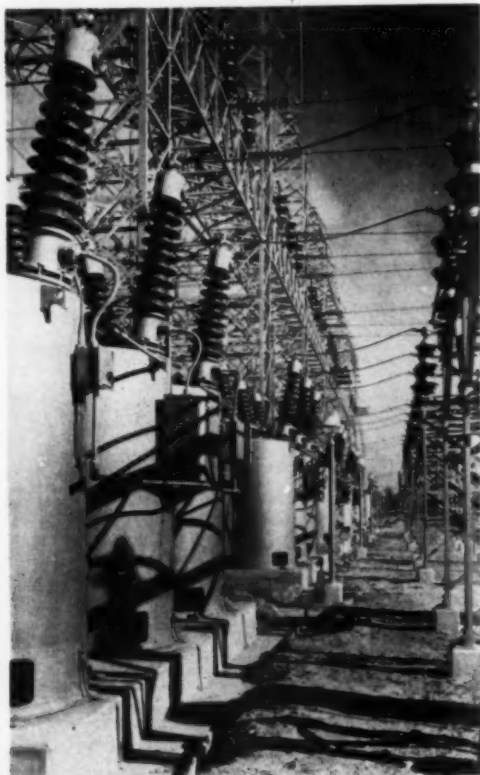
DRIFT EQUIPMENT

Forced Draft Fans Four—Buffalo Forge Corp., speed controlled through American Blower Corp. type VS hydraulic coupling. Drive—Westinghouse Electric Corporation motor; 500 hp, 2300 volt, 107 amp, 88 rpm.
Induced Draft Fans Four—Buffalo Forge Corp., speed controlled through American Blower Corp. type VS hydraulic coupling. Drive—Westinghouse Electric Corporation motor; 500 hp, 2300 volt, 200 amp, 705 rpm.
Chimneys Alphons Custodis Chimney Construction Co., 175 ft high with 22 ft top inside diameter, of radial brick.
Breeching and Ducts R. D. Cole Mfg. Co.
Draft Gages Republic Flow Meters Co.

BOILER FEEDWATER EQUIPMENT

Boiler Feed Pumps Six—Byron Jackson Co., 9 stage, capacity 578,000 lb per hr, head 1650 psi diff, speed 240 rpm. Speed controlled through American Blower Corp. hydraulic coupling. Drive—Westinghouse Electric Corporation induction motor; 1500 hp, 2300 volt, 320 amp, 3578 rpm.
Extraction Heaters Two—vertical, 18th stage, 2 pass, U-tube, 4,925 sq ft; two—vertical, 9th stage, 2 pass, U-tube, 2,320 sq ft; two—vertical, 16th stage, 2 pass, floating head, 2,480 sq ft; two—vertical, 18th stage, 2 pass, floating head, 2,150 sq ft, by The Gricecum-Russell Co.

View of outdoor substation for Georgia Power Company's Plant Yates near Newnan, Georgia.



Generating Heaters Four, Elliott Co., Two—Feedwater, 975,000 lb per hr each. Two—Evaporator preheater, 41,400 lb per hr each.
Feedwater Regulators Two—Copes Balanced Flow, Northern Equipment Co. Normally through scoop tube adjustment on boiler feed pump hydraulic coupling, alternately through feedwater regulator valves.
Evaporators Two—The Lummus Co., U-Tube type, capacity 10,000 lb per hr each, 1550 sq ft heating surface.
Clarifier Graver Water Conditioning Co., 400 gpm, reactivator with feeder.

ASH HANDLING EQUIPMENT

Ash Hoppers Allen-Sherman-Hoff Co.
Sluicing Equipment Allen-Sherman-Hoff Co.
Fly Ash Removal Allen-Sherman-Hoff Co., Hydro-vactor automatic sequential removal.
Fly Ash Precipitators Western Precipitation Corp.

PIPE AND PIPE COVERING

Piping Contractor Blaw-Knox Construction Co.
Steam Headers 16" Chrome-Molybdenum
Check Valves The Chapman Valve Mfg. Co.
Gate and Globe Valves The Chapman Valve Mfg. Co.
Pressure Reducing Valves Fisher Governor Co.
Small Valves Jenkins Brothers; Edward Valves, Inc.; The Ohio Injector Co.; Hancock; Manning, Maxwell & Moore.
Reverse Flow Valves Henry Pratt Co., condenser circulating water reversing valves.
Relief Valves Manning, Maxwell & Moore, Consolidated.
Traps Armstrong Machine Works.
Expansion Joints Badger Mfg. Co., copper.
Pipe Covering Contractor Armstrong Cork Co.
Pipe Covering Material High Temperature or 85% magnesia, canvas covered.

INSTRUMENTS

Steam Flow Meters Two—Hagan Corp.
Feedwater Flow Meters Two—Hagan Corp., ring balance.
Pressure Gages Ashcroft; Manning, Maxwell & Moore, indicating. Republic Flow Meters Co., recording.
Vacuum Gages Ashcroft; Manning, Maxwell & Moore, indicating. Recording—Republic Flow Meters Co.; The Foxboro Co.
Mercury Columns American; Manning, Maxwell & Moore.
Thermometers American; Manning, Maxwell & Moore, indicating. Recording—Leeds & Northrup Co.
Conductivity Recorders Three—Leeds & Northrup Co.
CO₂ Recorders Leeds & Northrup Co.
Barometers American; Manning, Maxwell & Moore.

ELECTRICAL EQUIPMENT

Switchyard Structures Erected by Georgia Power Co.
Main Transformers Six—Westinghouse Electric Corporation, 41,000 kva, single phase, 13,200 and 110,000 volt.
Auxiliary Transformers Westinghouse Electric Corporation, 110,000 to 2,400 volt, 3 phase; 13,500 to 2,400 volt, 3 phase; 2,400 to 575 volt, 3 phase.
Oil Circuit Breakers and Disconnect Switches Westinghouse Electric Corporation; Johnson Mfg. Co.
Switchgear Westinghouse Electric Corporation
CO₂ Fire Protection Equipment C-O-Two Fire Equipment Co.
Storage Battery The Electric Storage Battery Co.; Exide Manches, 440 A. H. at 1 hr rate.
Battery Chargers General Electric Company control panel, MG set by The Electric Products Co., Diverter-Pole 7.5 kw, 140 d-c volts.
Emergency d-c Generator United States Motors Corporation, gasoline engine driven generator; 120 volts, 307 amp, d-c.

MISCELLANEOUS

Pumps De Laval Steam Turbine Co.; 1—screen wash, 1750 gpm; 2—cooling water, 1700 gpm each; 2—ash sluice, 1750 gpm each; 2—house service, 1700 gpm each.
 Two—Worthington Pump & Machinery Corp., heater drain pumps, 250 gpm.
Air Compressors Two—Ingersoll-Rand Co.; cylinder 17" stroke 11", 100 psi, 300 rpm. Drive—Westinghouse Electric Corporation 60 hp V-belt connected motor.
Turbine Room Crane Cleveland Crane & Eng. Co.; main hoist capacity 200 tons and auxiliary hoist capacity 25 tons, span 115 ft, lift 90 ft.
Motor Drive Couplings Fast's; Koppers Co., Inc.
Derrick American Hoist & Derrick Co., stiff leg derrick, 100 ft boom, 46 ft mast.
Plant Phone System Kellogg Switchboard & Supply Co.
Sound Proof Booths Burgess-Manning Co.
Traveling Intake Screens Four—Link-Belt Co., 100,000 gpm each.
Vacuum Cleaning System United States Hoffman Machinery Co.
Tanks R. D. Cole Mfg. Co., 1—sanitary water, 50,000 gal; 1—house service water, 50,000 gal; 1—condensate storage, 50,000 gal; 2—lighter oil, 35,000 gal each; 1—turbine oil storage, 2,000 gal.

CONTRACTORS

General Contractor Georgia Power Company.
Excavation and Concrete MacDougall Construction Co.
Steel Steel Construction Co.
Siding Guaranteed Waterproofing Co.
Piping Blaw-Knox Construction Co.
Insulation Armstrong Cork Co.
Electrical J. M. Clayton Co.
Glazing, Floors & Miscellaneous Honemaker-Clayton Construction Co.



New Transmission Belt Has Teeth

Can replace flat belts, V-belts, chain drives and gears in many applications . . . operates on fixed centers without take-up adjustments . . . low maintenance . . . no lubrication . . . will not stretch.

HERE is brief applicational data on the new Gilmer Timing Belt being marketed initially through the L. H. Gilmer division of United States Rubber Company.

Belt is similar in appearance to a flat belt except that it has regularly spaced rubber teeth along its inner surface which engage in corresponding grooves in the pulleys.

The belt requires no lubrication. However, oil will not harm it. It is unusually compact and speed

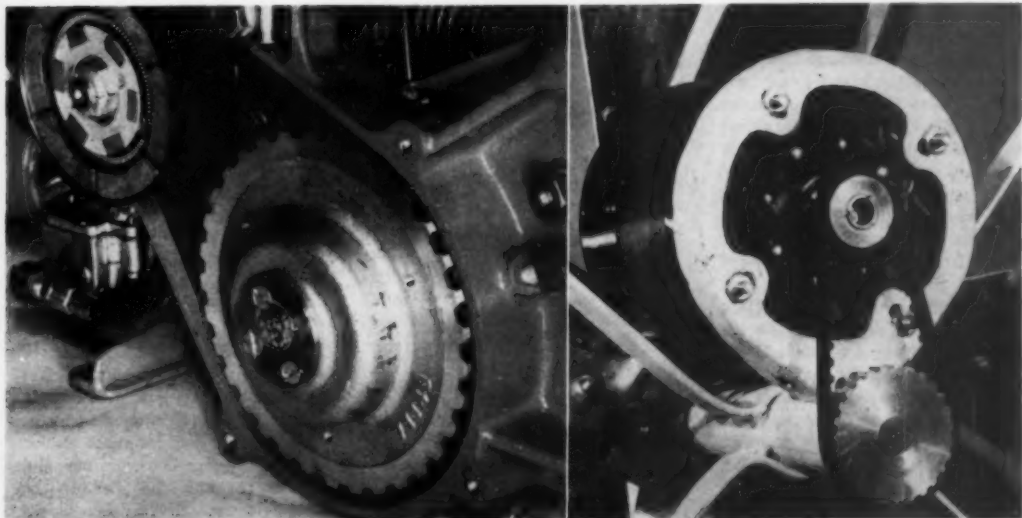
ratios up to 30:1 are possible with it. The belt's extreme flexibility permits pulley diameters as small as one-half inch at 10,000 rpm even with a heavy load.

United States Rubber states that in floor polishers, sanders, saws and other portable tools, it has replaced flat belts, V-belts and chain drives with a sizeable reduction in costs, elimination of lubrication problems and higher operating speeds.

Close-up of new belt with teeth. Note belt has positive engagement with pulley. Will not slip, permits split-second timing, and will attain speeds up to 16,000 fpm.

Here is the new belt driving a 4 hp portable chain saw produced by the Homelite Co. Since belt will not slip, full power is possible. At same time, instantaneous stalls, which would break gear teeth, have no effect on the belt.

Teeth on Gilmer Timing Belt make possible much smaller drive for this fan than would be needed if standard V-belt were used. Slippage problem is eliminated, no lubrication is needed. Much less starting torque is required.





Century Furniture Company's modern 100,000 sq ft plant at Hickory, N. C. Woodworking shop is at far end. Production flows to shipping department in foreground. Additions are planned for immediate increase in production.

Wood Waste Disposal at Century Furniture—Hickory, North Carolina

By GUY BROWNING ARTHUR

FURNITURE manufacturing has a high percentage of waste in small pieces, both of original lumber and plywood. Hickory is one of the important centers of the industry in North Carolina, which, as a whole, is the country's chief supplier of furniture.

The Century Furniture Company's plant is only two years old, but the firm has established itself firmly in the trade with superior lines of dining room and bedroom suites, the output about evenly divided between the two. At present the plant has 103,300 sq ft all on one floor. Additions are to be built shortly to expand the production of the present lines, and to make some new furniture products that will use some of the waste pieces.

Any furniture plant may have some of the elements of a good disposal system, but a completely efficient system can usually be installed only when a plant is being built. The system in the Century plant is virtually an exhibit of what the plant designer and the machinery manufacturer consider a good job. It was designed as an integral part of the plant, and is working with complete satisfaction.

Except for small auxiliary units, the entire refuse conveying system is underground. Modern production equipment and straight line flow of materials makes Century Furniture an efficient operation.

Design Features

The system is under the concrete floor, except small auxiliary conveyors for individual machines. Each conveyor is individually motor driven. One conveyor, No. 3, operates on an incline to receive its load and discharge it. All the waste is used under the boilers in the winter, but some of it has to be hauled away in the summer. The conveyors are wider than needed for their carrying capacity—wide enough to handle the long pieces in the bulk of waste without jamming.

All conveyors are of the sliding type, slow speed, returning the canvas belts on widely spaced rollers underneath.

Lumber comes in on trucks through a rear door to the lumber

lift, to be raised as used. Cutting for furniture pieces begins here, with two Porter cut-off saws directly in front of the lumber lift. This is the first point where waste is made, and the sturdy sheet metal chutes beside the saws are typical. There is a similar one beside each machine. The chutes are placed so that the machine operator sweeps the cuttings off the table into the chute with one movement.

The first conveyor, No. 1, runs crosswise under the floor, taking the refuse from the cut-off saws. It is an 18" belt, 42' center to center, driven by a 3 hp Fairbanks-Morse motor. Its burden is largely blocks off the ends of rough boards. There is a market for these blocks, so the conveyor is reversible, and extends through the wall of the plant. It can deliver waste blocks



Chutes are placed so that machine operator sweeps cuttings off the table into the chute with one movement.

from the chutes of six important machines. These are a Dennis veneer taping machine, made by the Veneer Machinery Company, a Diehl splicer, a Columbia clipper, a Capital clipper, and two Tannewitz band saws.

All the waste is discharged into the Williams hog by the No. 5 conveyor. The hog is driven by a 30 hp Allis Chalmers motor. Ground up splinters drop into the Kirk & Blum exhaust system. A 30" Kirk & Blum fan, powered by a 10 hp G.E. motor, is mounted high in the boiler room. It sucks the waste through a pipe connected to the hog, and carries it through a concrete tunnel to the boiler house, where it rises to the fan. From the fan the waste is blown into the boilers as fuel.

Efficient Operation

One comment heard in the plant is that long pieces of waste would straighten out quicker on the belts if the bottoms of the troughs were slightly concave instead of flat. The belts are wide enough for the shapes and sizes of the waste pieces if the longer pieces would straighten out quickly and travel lengthwise. This quicker straightening might be troublesome where

one conveyor empties into another at right angles, but even then the concavity of the trough bottoms might break up a jam more quickly.

A wide variety of sizes and shapes of waste pieces brings up another point. Here at the Century plant it is not a problem, but it is in many others. This is the direction of discharge from one conveyor into another. If all the waste pieces were small blocks they could be dumped from one conveyor into another, or into an elevator boot, in any direction. But when the pieces are long, as they come off the band saws, it is another matter.

This would not be so dangerous if the pieces were cut-offs from original lumber. Then they might break up in a jam, and cause no trouble. Plywood, because it is



All waste is discharged into the Williams hog, driven by a 30 hp Allis Chalmers motor. Ground up splinters drop into a Kirk & Blum exhaust system.

strong in all directions, does not break up. Then the direction in which long pieces go from one conveyor to another, or to an elevator boot, becomes important.

A curved chute from the head end of one conveyor to turn the waste load in the flow-direction of the next conveyor can be used if there is sufficient head height for the longer slope of the curved chute. But this extra head height cannot always be had.

The excellent designing of this Century plant puts the machines in straight lines, so that the refuse conveyors run in straight lines under the floor. Production flows naturally from raw lumber to fin-



Mr. P. E. Smith, Superintendent of the Century Furniture Company's Hickory, N. C., plant, was one of the designers of the waste disposal system.

ished pieces ready for the assembly rooms. Openings through the floor run the full length of the conveyors, with recessed edges to receive the slip-proof steel plates which cover them.

Starting from scratch, as the designers did, it was possible to foresee and handle most of the disposal problems. Much of this planning was done by Mr. P. E. Smith, Superintendent of the plant. Placing the woodworking department as the receiving end of the layout, and flowing production straight through the length of the plant to finished furniture, is highly successful. Additions to the establishment can be made without pushing the wood-



This 30-in. Kirk and Blum fan, powered by a 10 hp G.E. motor pulls splintery waste ground up in Williams hog across the building through a tunnel and blows it into the boilers.

working department beyond its potential capacity.

Outside the main building are three 50,000 foot kilns and storage space for 150,000 feet of lumber. There is also a large storage space for veneer. About 450,000 feet of lumber is being cut every month.

Principal Suppliers

Principal suppliers of the equipment mentioned in this discussion of Century's modern furniture pro-

duction setup are: *The Kirk & Blum Manufacturing Company*, Cincinnati, Ohio; *Williams Patent Crusher & Pulverizer Co.*, St. Louis, Mo.; *Veneer Machinery Co.*, Grand Rapids, Michigan; *G. M. Diehl Machine Works*, Wabash, Indiana; *Columbia Machinery and Engineering Corporation*, Hamilton, Ohio; *Capital Machine Co.*, Indianapolis, Indiana; *The Tannewitz Works*, Grand Rapids, Michigan; *C. O. Porter Machinery Co.*, Grand Rap-

ids, Michigan; *Greenlee Brothers & Co.*, Rockford, Illinois; *Beach Manufacturing Co.*, Montrose, Pennsylvania; *Mattison Machine Works*, Rockford, Illinois; *Walters Manufacturing Co.*, Morristown, Tennessee; *Bell Machine Company*, Oshkosh, Wisconsin; and *Busa Machine Works*, Holland, Michigan.

Harley F. Shuford is President of the Century Furniture Company and E. L. Woodward and L. S. Walworth Vice Presidents.

Versatile Hand Truck

IN moments when it is not assigned to its regular materials handling task, this Transtacker is used to keep heavy stacks of paper in front of cutting machine at operational level. The battery operated hand truck saves considerable time in lifting paper to the machine.

Lifting stacks of paper from floor level in customary manner is considered to be excessive muscular strain on the employee. Transtacker, made by the Automatic Transportation Company, is raised gradually as pile of paper dwindles.



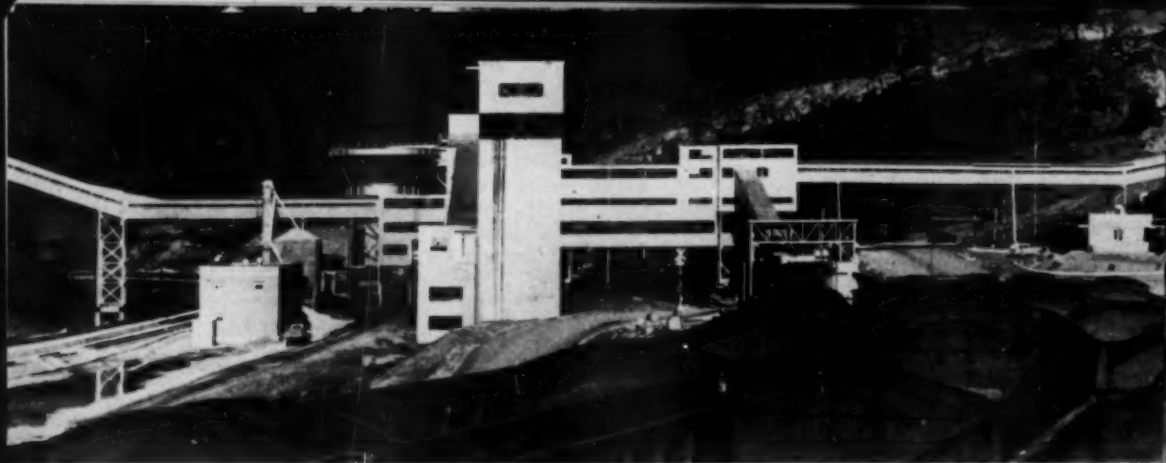
Safety With Ease

STORING a drum of thinner on the top rack in the paint storage room of this Westinghouse plant is done easily and safely with a floor operated bridge crane and a movable ladder.

Other safety features of this paint storage room are: use of vapor proof electrical fittings and fixtures; spark proof floors and tools; exhaust fans to maintain vapors below explosive mixtures at all times; spring-closing brass valves on drums where it is necessary to make withdrawals; and the use of drip pans under valves to prevent spread of thinner and fast evaporation.

Such mechanical aids materially help in making safety practices a habit.





Inland Steel Company's Modern Coal Preparation Plant at Price, Kentucky

The steel and concrete preparation plant, designed and built by the Link Belt Company is in a valley. Coal from a mountainside mine portal is carried down hill by conveyor from a rotary dump which unloads two mine cars at each operation. Rock and refuse from the mine and that discharged from the cleaning plant is conveyed up the opposite mountainside for disposal.

Mechanized Coal Preparation—Ky.

Modern 750 ton per hour capacity plant sorts, crushes, washes, blends and loads coal into railroad cars. Belt conveyors are used to transport coal through most of the processing sequence.



THE modern streamlined coal preparation facilities of Inland Steel Company at Price, Kentucky, include a settling cone (left background in the above general view), process building extending through the center and the tall blending bin in the foreground. Buildings are enclosed with asbestos-protected metal siding and have been equipped with continuous ventilating sash.

Plant is located near the center of remaining reserves of Inland's mines in Floyd County, Kentucky. Inland plans to process at the plant all of the high volatile coal it uses in the manufacture of steel.

Advantages

The placing in operation of this

Above left—Coal is transported from the headhouse to the preparation plant on the belt conveyor at the left and mine rock on conveyor at the right. Idlers for both Link-Belt conveyors are equipped for lubrication from the center aisle of this enclosed gallery.

Individual cars are weighed as they are being fed into the Link-Belt car dumper, where they are dumped two at a time without being uncoupled. Control panel for the trip feeder and car dumper can be seen between the scale room on the left and the dumper operator on the right.

new coal preparation plant enables Inland Steel to reduce the cost and to increase the production of pig iron without the erection of new steel making facilities.

Inland's coking coal from eastern Kentucky is inherently low in ash. Old hand loading mining methods produced a coal with approximately 5.1 per cent ash, whereas coking coal is commonly used by other steel producers with from 7 to 8 per cent ash. By the introduction of modern coal cleaning methods, Inland has further reduced this low ash content of its coal and thus increased pig iron production.

The new well-engineered plant contains the most advanced equipment for the efficient preparation of run-of-mine bituminous coal for metallurgical use. Designed and built by Link-Belt Company, the plant has a capacity of 750 tons of raw coal an hour. Slate, rock, fire clay and other impurities are mechanically removed. An elaborate system of blending bins, paddle mills, and conveyor systems permit the automatic mixing of sizes and analyses for delivery direct to railroad cars.

Moreover, the new plant enables Inland to engage in "total seam" mining at its Eastern Kentucky properties. By extracting coal in fault areas which could not previously be mined at favorable costs, Inland not only is increasing ton-per-man production of coal, but is recovering a larger percentage of the total coal deposit before with-

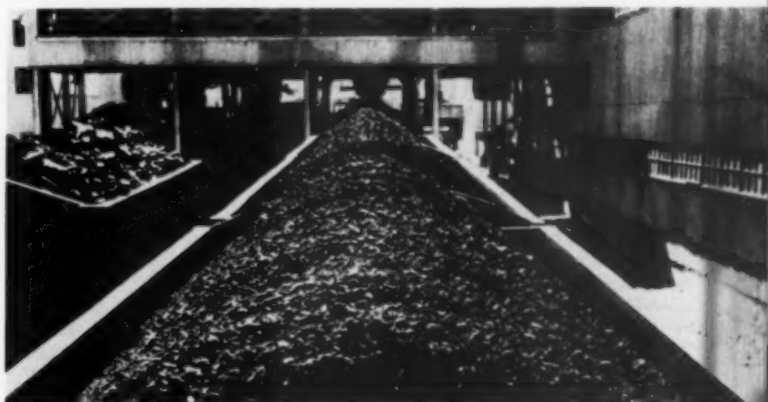
drawing from a specific area.

The new plant, by coming into operation now when steel is in demand and material for new facilities is difficult to procure, assumes interest beyond that of just another new coal tippie, since it increases the production of pig iron and conserves scarce coking reserves.

Re-Use of Wash Water

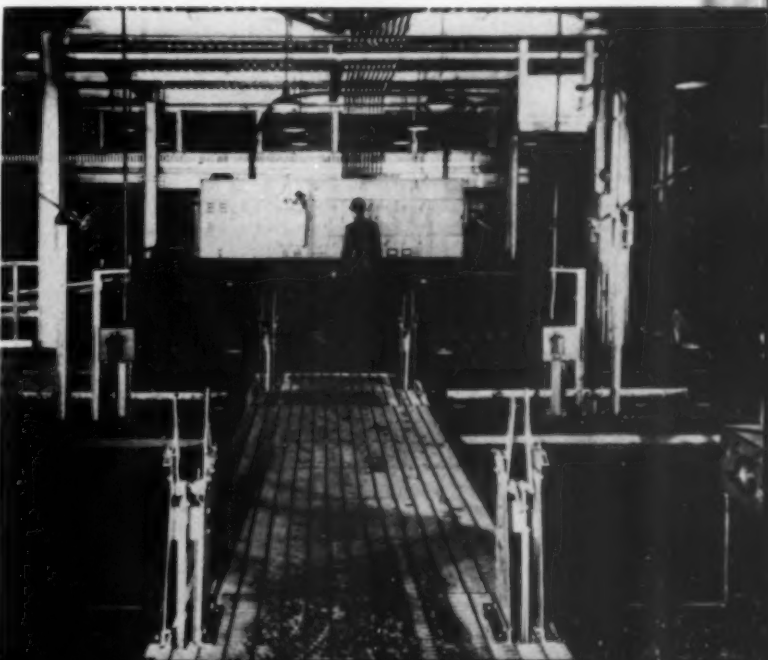
As illustrated, the plant is equipped with Link-Belt air pulsed wash boxes for cleaning the coal. Major portion of the water used in these washers is clarified in the 50-ft diameter settling cone

and the Bird centrifugal filters are utilized for clarifying the water used on the concentrating tables. The clarified water from these filters is first pumped directly to the air pulsed washers where it joins a portion of the cone overflow and is used to wash the coarse coal, after which it is pumped to the settling cone. The water required for the concentrating tables is taken from the cone overflow and after clarification in the centrifugal filters, it is again returned to the air pulsed washers and is in effect used in both the coarse coal and fine cold washing processes.



Coal for use in the coke ovens at Inland Steel Company's Indiana Harbor Works is virtually free of all ash-forming impurities as it flows into railroad cars.

All operations are controlled from this master pulpit located in the center of the coal washery. Ash-forming refuse is automatically removed from the coal in two Link-Belt air-pulsated coal washers located to the left and right of the central walkway. As coal passes through the washers it is subjected to the alternating upward and downward action of water, which causes the clean coal to rise and be discharged over a weir at the top, while the heavier impurities — clay, rock, slate, etc.—are automatically removed from the bottom as fast as they accumulate.



Measurement and Control of

By E. A. MURPHY, Brown Instruments Division, Minneapolis-Honeywell Regulator Co.

AMONG the limitations of the millivoltmeter pyrometer, discussed in the March issue of SOUTHERN POWER & INDUSTRY, were: lack of torque or power necessary to operate certain types of control units, lack of sensitivity to very small temperature changes over narrow temperature spans, and the effect on the instrument of the resistance of the electrical conductors which connect the temperature sensing element to the instrument. This factor imposes limitations on the allowable distance between the point of measurement and the instrument.

Since many industrial applications demand extreme sensitivity and accuracy in the measurement of certain variables, and since there has been a continuing trend toward the use of centralized instrument panelboards requiring that the instruments be mounted an appreciable distance from the point of measurement, it soon became evident that the millivoltmeter pyrometer was not universally acceptable throughout industry.

Millivoltmeters and Potentiometers

The millivoltmeter can be likened to the spring-opposed penny platform weighing scale, in which an indication of weight results when a condition of balance exists between the opposing forces set up both by the weight of the individual on the platform and by a calibrated spring within the scale.

Obviously, the accuracy of such a scale depends upon the opposing strength of the spring, friction of parts and linkage, and similar factors which can be kept constant only with careful servicing and adjustment.

The potentiometer operates on the principle of the analytical balance used in the laboratory or the beam and balance scale seen in doctors' offices. The unknown weight is placed on one side of the scale, while weights of known value are added to the other side until a pointer indicates zero deflection at which time the known weight is exactly equal to the unknown weight.

In the case of a potentiometer, an unknown voltage from the temperature sensing element is balanced against a known voltage from within the instrument.

This is the 5th in a series of SP&I articles dealing with variables commonly encountered in the industrial plant and the principal means available for measurement and control.

In order to handle those applications where the millivoltmeter fell short, an instrument employing a potentiometer bridge circuit was perfected. The industrial potentiometer is frequently referred to as a **null balance** or **detectional** type instrument, as opposed to the millivoltmeter which is known as **deflectional** type instrument.

Principles of Operation

The illustrated basic potentiometer circuit is an extremely accurate method of measuring differences in potentials or electrical voltages. In order to understand its operation, it is necessary to have only a basic knowledge of the fundamentals of electricity.

It must be assumed that the battery is supplying a constant voltage across resistors R_1 , S , and R_2 . If such is the case, the poten-

tial drop across resistor S is known and constant. Resistor S is made in the form of an evenly wound coil or slidewire, along the surface of which movable contactor C is free to move. Since S is evenly wound, the potential drop across any increment or part of S is also known. This potential drop, or voltage, the value of which will depend on the position of contactor C on slidewire S , is the known quantity and can be compared to the calibrated weights placed on one side of an analytical balance.

The unknown quantity—the voltage produced by the temperature sensing element (in this case a thermocouple)—opposes this known voltage.

If contactor C is not positioned on S so that the known voltage produced by the battery is exactly equal to the thermocouple voltage, a current will flow through the circuit, and the galvanometer pointer will be deflected. When contactor C is moved along slidewire S until the known and unknown voltages are exactly equal, current will no longer flow and the galvanometer pointer will return to zero.

If a scale is mounted above S and if each position of the contactor C along both the slidewire and the scale is calibrated for the voltage generated by the thermocouple, each scale position of an index which moves in relation to contactor movement will indicate a condition of electrical balance between a given unknown thermo-

Process Variables—Part 5

Mechanical Potentiometers

Mechanical potentiometers, employing potentiometer bridge circuits, are capable of handling many of the millivoltmeter limitations pointed out in the previous discussion.

couple voltage and a known voltage from the battery in the instrument.

Calibration

We then go one step further and calibrate the scale directly in temperature units. This is possible because every type of thermocouple has a known temperature-voltage relationship, i.e. an iron-constantan thermocouple, for example, will generate 26.41 millivolts when its hot junction is at 900 F and its cold junction is at 32 F. With this knowledge, it is possible to apply a known voltage of 26.41 millivolts (corrected to allow for the difference between 32 F and the temperature actually existing in the instrument case) to the basic potentiometer circuit (in place of the thermocouple) and to move contactor C until the galvanometer pointer rests on zero. Since the index which is actuated by the same mechanism that actuates the contactor is also moving along the scale, this position on the scale can be marked 900 F. Complete temperature-voltage tables exist for all widely used types of thermocouples, so it is possible to calibrate the scale over the entire range of potentiometer. The preceding description serves to illustrate why it is possible to measure electrical quantities and yet have a scale that is calibrated directly in temperature units. Resistors R_1 and R_2 establish respectively the "zero" point on the slidewire, and the over-all range

of the slidewire, i.e. minimum and maximum millivoltage the potentiometer can measure.

Modified Circuit

There are several reasons why the basic circuit shown must be modified for industrial use. Changes in the resistances of the various resistors caused by temperature changes within the instrument case must be avoided since such changes would create a false circuit unbalance and introduce sufficient error into the measuring circuit to cause erroneous temperature readings.

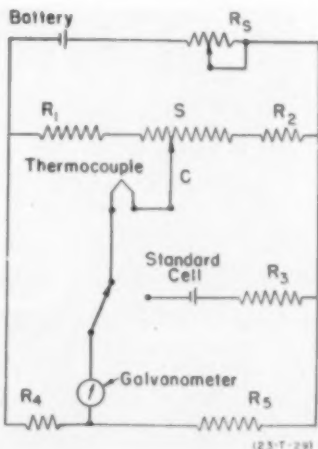
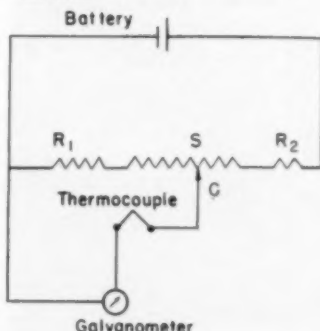
This situation is usually handled through the use of Manganin resistors in the bridge circuit. Since this metal has a negligible

temperature coefficient, the temperature changes normally encountered within the instrument case do not change their resistance, and consequently no measuring error is introduced.

It is also of utmost importance that the battery, or known voltage, applied to the bridge be kept constant. Any change in this voltage will also unbalance the bridge circuit, causing an incorrect indication of temperature.

This condition is taken care of by a standard cell and necessary standardizing equipment as illustrated. The standard cell produces a constant small voltage which is unchanged by ageing or normal temperature variations. It is essential, however, that only a small amount of current be drawn from this cell, otherwise its emf will be reduced temporarily because of polarization. Resistor R_3 allows only a small current to flow from the cell when it is connected into the instrument circuit momen-

The basic potentiometer circuit, shown below, is an extremely accurate method of measuring differences in potentials or electrical voltages. For industrial use however, this basic circuit must be modified as shown on the right.



tarily for purposes of standardization. Shown immediately above the galvanometer is the standardizing switch which disconnects the thermocouple from the measuring circuit and connects the standard cell. This switch, usually manually operated, is normally spring-loaded, so that, when released, it will automatically disconnect the standard cell from, and return the thermocouple to the measuring circuit.

R_s is the standardizing resistor. It includes a sliding contactor which can add resistance to or remove it from the circuit connecting the dry cell battery with the measuring circuit. In order to standardize the measuring circuit, the standard cell is connected into the circuit by means of the spring-loaded switch. If the battery voltage has dropped below the constant voltage supplied by the standard cell, current will flow through the circuit, and the galvanometer pointer will be deflected. The sliding contactor on resistor R_s is then shifted to remove resistance from the circuit until the battery and standard cell voltages balance, and the galvanometer pointer returns to zero. Standardization is accomplished periodically to compensate for ageing of the dry cell battery.

In the third place, there must be some means of compensating

for the temperature of the cold junction of the thermocouple which is usually in the instrument case. This is necessary since the emf generated by any thermocouple depends entirely on the temperature differential existing between its hot and cold junctions. Obviously, then, any appreciable temperature change occurring at the instrument case will cause a change in the emf output of the thermocouple thus unbalancing the measuring circuit and causing an error in the measured temperature. In industrial potentiometers, resistors, usually of nickel wire, appropriately placed in the measuring circuit, automatically compensate for changes in the temperature of the cold junction.

The Mechanical Potentiometer

The industrial mechanical potentiometer utilizes the modified circuit just described. It consists essentially of the following components: necessary resistors, slide-wires, etc., to make up an electrical measuring circuit similar to that illustrated; a galvanometer to sense current flow through the circuit which is indicative of a change in the measured temperature; a "feeling" or detecting mechanism which measures the amount of pointer deflection; a motor-driven balancing mechanism which: (1) automatically

adjusts the circuit resistance to return the galvanometer pointer to zero, and (2) simultaneously moves the instrument pen and pointer along the chart and scale to record and indicate the measured temperature; a battery (usually dry cell) to supply the known voltage to the bridge circuit; a standard cell for purposes of "standardizing" the known bridge voltage at periodic intervals; a recording chart driven by a separate motor; and an indicating scale. If the instrument is a multiple recorder or a controller, additional components are required.

Although there are many different makes in use, they differ mainly in the manner in which the mechanism within the instrument detects movement of the galvanometer pointer and moves to bring the circuit back into electrical balance. In almost every case, one motor is used to drive the chart, while a second motor drives the balancing mechanism.

One type of instrument employs a "feeling" mechanism which periodically detects the position of the galvanometer pointer. When the pointer is found to be at any other than zero position, this mechanism automatically moves the slidewire contactor, and consequently the instrument pen and pointer, until the galvanometer pointer returns to zero.

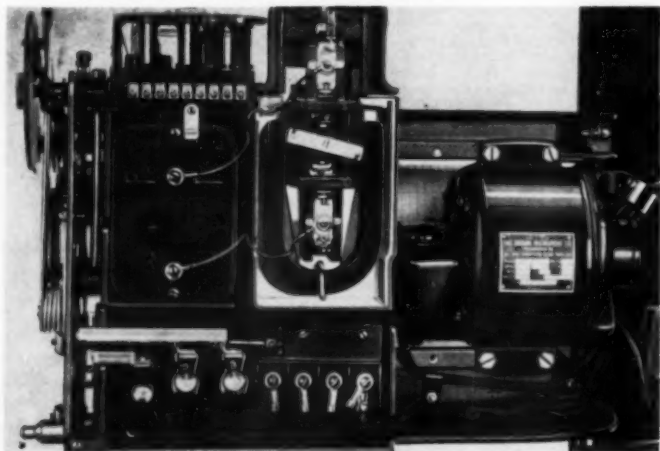
In another type, the galvanometer pointer itself carries electrical contacts which energize the balancing motor when pointer deflection occurs.

A vane mounted on the galvanometer pointer of still another type moves between two oscillator coils when the pointer deflects, in this way energizing the balancing motor.

In a fourth type, the galvanometer pointer carries a small mirror which directs a beam from a fixed light source onto photocells when pointer deflection occurs. In this case, the photocells actuate the balancing motor.

Where a high degree of accuracy and sensitivity is demanded in an industrial temperature measuring instrument, the potentiometer is almost always used. Possibly the greatest single ad-

The number of finely machined moving parts associated with the detecting and rebalancing mechanism of this typical mechanical potentiometer demand rather frequent lubrication and cleaning, especially when instrument operates in abrasive or corrosive industrial atmospheres.



vantage of this type instrument is the fact that its accuracy is not affected by the resistance of the thermocouple, extension wire and galvanometer. This is true, of course, because at the point of electrical balance, when the instrument is indicating and recording the measured temperature, there is no current flowing through the measuring circuit. As a result, it is possible to mount the instrument quite some distance from the point of measurement without any sacrifice in accuracy.

Since it measures temperature in terms of electrical quantities, the potentiometer like the millivoltmeter, can be used with any of several types of sensing elements such as thermocouples, re-

sistance thermometer bulbs or radiation sensing elements. It can provide records of several different temperatures on a single chart.

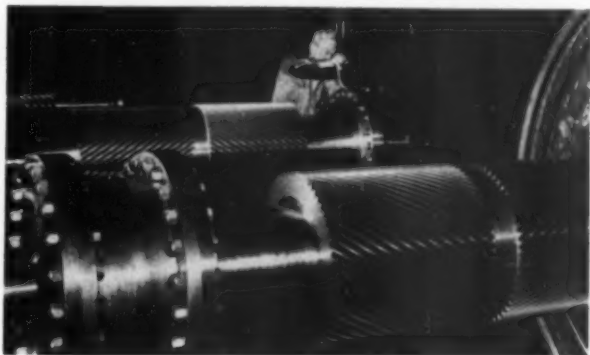
The mechanical potentiometer, however, does have some disadvantages when compared with its modern counterpart, the electronic potentiometer. In the first place, measurement is usually cyclic, rather than continuous, i. e., when the measured temperature changes the galvanometer pointer deflects; some sort of "feeling" mechanism detects this deflection, and sets into motion the rebalancing mechanism. The new temperature is not accurately indicated or recorded until this chain of mechanical operations have been concluded and the galvanometer

pointer has returned to zero. Practically speaking, this is a drawback only when the measured temperature is changing rapidly, and when even the smallest temperature deviation must be almost instantaneously indicated or recorded.

There are many mechanical potentiometers giving satisfactory service throughout industry today. When properly installed and adequately serviced, they provide extremely accurate and very reliable temperature measurement. The present trend, however, is toward the electronic potentiometer which combines the accuracy of potentiometric measurement with several additional features. This instrument will be described in the June issue.

Turbine Gear Set for Mississippi Shipyards

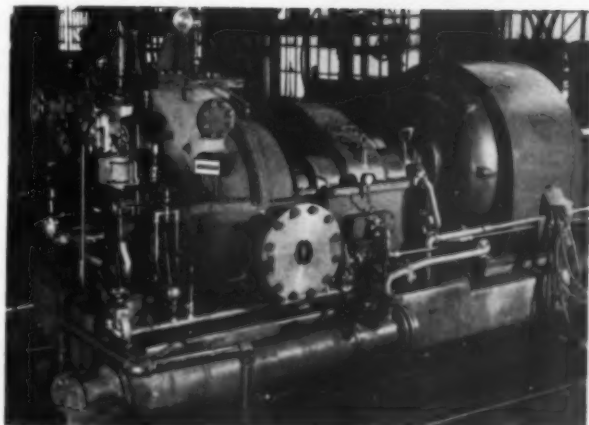
READIED for shipment to the Ingalls Shipbuilding Corp., Pascagoula, Miss., pinions and gears are assembled by a workman at the Lynn, Mass., turbine plant of General Electric. The equipment will be part of the propulsion unit for a U. S. Maritime Administration prototype cargo-passenger vessel.



Steam Turbines for Gas Transmission Lines

THE Transcontinental Gas Pipe Line Corp.'s new Houston to New York pipeline will use turbine driven high pressure centrifugal compressors in three of its booster stations. This is a radical departure from the standard practice of using reciprocating gas-engine driven units or motor driven centrifugals for high pressure natural gas transmission.

This is one of the six 800 kw De Laval turbine generators to be used.



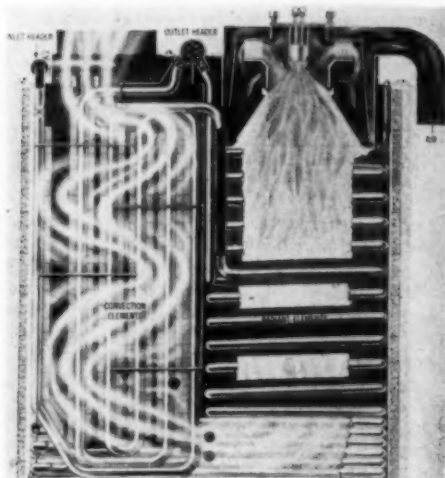
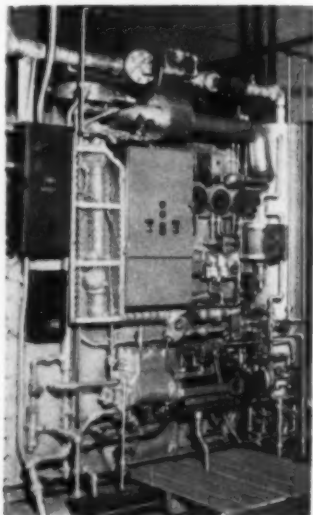
Self-Contained Re-circulation Steam Generator

Compared to small conventional water-tube boilers or packaged type fire-tube units compact generator will produce 3 to 4 times as much steam per cu ft of space occupied.

AN outstanding feature of the new steam unit announced by Combustion Engineering - Superheater, Inc., is its compactness. The 6,000 lb capacity unit for burning light oil or gas occupies a space 6'11" long x 5'5" wide x 6'11" high, and the heavy oil burning unit is only slightly larger.

This generator is different from

Typical installation of the new steam generator in a textile mill.



Vertical section through the C-E Re-circulation steam generator showing burner, windbox, radiant elements, convection elements with cross baffles and inlet and outlet headers.

all other types of small steam generators, according to the manufacturer, in that it employs controlled recirculation. The high rate of heat transfer made possible by the use of this principle permits maximum steam production per unit of heating surface and thus makes possible maximum steam output per unit of space and weight. Moreover, controlled recirculation assures positive circulation through-

out all heating surfaces, virtually eliminates scale formation and permits higher operating efficiency.

Component Parts

The principal parts of the generator comprise the heating elements, operating motor, feedwater pump, feedwater regulator, circulating pump, burner, fuel oil pump and air blower. The heating surface consists of a number of radiant and

Industrial Applications

INITIAL applications in industrial and institutional plants were made early in 1950. These were highly successful and since then a number of generators have been purchased for such various types of service as space heating; processing of tobacco, chemicals, cotton fabric, asphalt, dairy products and paper products; space heating in a central station when utility boilers are not operating; process steam for pickling vats, vulcanizing rubber and plating die castings; and heating stills.

According to the manufacturer, experience on these installations demonstrates that the generator is particularly applicable where one or more of the following conditions apply:

1. Where high pressure steam is required in relatively small quantities.
2. Where steam is required in remote locations, normally involving the expense of installing and maintaining long insulated pipe lines.
3. Where demands are intermittent—a few hours each day or week.
4. Where load is highly fluctuating and involves sudden heavy demands necessitating fast pick-up.
5. Where completely automatic operation with a minimum of attention is necessary or desirable.
6. Where space is a problem or where maximum output from minimum space is desired.

convection elements within a paneled steel casing. Each element is connected both to the inlet header and the outlet header. An orifice at the inlet end controls the flow of water to the element.

The outlet header is connected with a vertical drum called a separator. The top part of the separator has a circular passage for the steam and water coming from the outlet header at high velocity. The centrifugal force throws the water to the outside of the passage, where it is carried to a vertical passage leading to the lower part of the drum and to the circulating pump. The steam is separated from the water and flows to the outside steam line.

The circulating pump, which is driven by a constant-speed electric motor, forces water at a velocity above the rate at which scale forms into the inlet header and then through the heating elements to the outlet header.

Two burners are provided to give maximum combustion flexibility. For starting, a small "all-on" or "all-off" electrically-ignited burner is operated by a pressure limit switch. It is limited to a steam demand of 700 lb per hr, after which a larger burner is cut in and operated up to maximum rating. At medium and heavier loads both burners are in operation. Fuel oil and air to the larger burner are adjusted by the combustion control

in accordance with load demands. The arrangement may be varied slightly to burn heavy fuel oil or gas.

Air for combustion is supplied by a blower and regulated by a damper that is controlled by the pressure of fuel oil, and the fuel oil pressure in turn is controlled by the steam pressure.

The feedwater pump, which is automatically controlled by a float system in the separator drum, pumps the feedwater to a closed heat exchanger where it is preheated by the heat of its exhaust steam. The preheated feedwater then enters the outlet header and the steam separator, where it is de-aerated.

Motor Maintenance Suggestions

By R. C. ROETGER

The electric motor is a simple, dependable piece of equipment but its performance is subject to age and the treatment it receives. Although a motor will run for months without attention, the value of periodic inspections cannot be over emphasized. Ten thorough inspections a year may prevent a costly breakdown, especially if the motors are operated under severe industrial conditions.

Mechanical

Every maintenance man appreciates the importance of proper lubrication and of keeping all oil rings and felts in good condition. It is best to err on the side of too much oil rather than too little. However, see that the oil does not soak the electrical insulation, brush holders, or any part of built-in contact mechanisms.

Mark motor housing before taking them apart so that they will be reassembled the same way. An exception to this is made sometimes in the interest of good lubrication. When a small motor is to be mounted upside down

or on its side, it is frequently possible and desirable to rotate the end bell a half or a quarter of a turn so that the oil cups will be vertical when motor is in operating position.

Perhaps the best way to check for worn bearings is to measure rotor to stator clearance. It should be the same on the top, bottom and sides. A slightly sprung shaft plus bearings worn so badly that the rotor eventually touches the stator may result in a costly smash-up.

Brush-holders and brush-shifting mechanisms should be checked to see that they operate freely and hold the brushes squarely and firmly against the commutator or slip-rings. After turning down a commutator undercutting the mica should not be neglected.

Centrifugal devices such as brush throwouts and necklaces on repulsion-induction motors and starting winding cutout switches should be examined for uniform and adequate spring pressure, freedom of action, and contact alignment.

Rotor bars and commutator segments should be tightened if necessary.

There are a number of ways of drying out motor coils that have been water-soaked, including passing sufficient current through the coil to heat it enough to drive off the moisture. A safe method is to place the coils, or in the case of a small motor the entire frame, in an oven at 220 F for about eight hours.

Heating and Loads

Overheating of motors may be caused by electrical conditions or by mechanical faults in the system. Seizing bushings and broken cages need hardly be mentioned and it is also assumed that the installation as designed is not demanding power in excess of the motor nameplate rating.

If brush-holders, rotor bars, etc. are in proper condition misalignment between the motor and the driven

unit, if beyond the limits allowed by the coupling or transmission, may be the source of the trouble. Flexible couplings have a definite limit as to the amount of angular and lateral misalignment they will absorb.

The condition of the driven unit must also be checked for it is possible that it is consuming more power than it should. There is the possibility that a motor slightly on the skimpy side may have been satisfactory for the original duty cycle but the demand period has increased.

Electrical

An insulation tester (megger) and the necessary volt- and ammeters should be on hand for routine motor checks. During these inspections insulation should be checked for breakdown and leakage and the windings for shorts and grounds. A growler is very useful for armature testing. Voltage and current readings taken under actual running conditions should not vary more than ten per cent from the nameplate ratings.

When trying to determine the cause of overheating not due to mechanical factors the following should be considered:

1. An open phase in a polyphase machine caused by failure in the supply or by an open winding.
2. Incorrect phase rotation caused by incorrect connections.
3. Low voltage in one or all phases.
4. Low field voltage.

When dismantling a motor, label all leads in order to insure correct reconnection. Common forms of errors are wrong winding sense, wrong winding connected to centrifugal switch of single phase machines, and wrong polarity of commutating poles.

The starting winding of single phase motors is the lighter of the two.

Commutating pole polarity can be checked with a compass. Considering a mark on the rotating armature passing under a North field pole, the mark should next

pass under a North commutating pole. Then it passes under a South field pole and next a South commutating pole etc. (In a generator the mark would pass from a North field pole to a South commutating pole.)

Failure of single phase motors to start is usually caused by a faulty capacitor or centrifugal switch more rarely by an open winding. Motors with negligible starting load can be started in an emergency by giving them a spin by hand.

When the capacitor is bad but the switch operating some motors will start under light loads by shorting out the capacitor.

A motor with a broken centrifugal switch can be started with a hand-operated switch used in place of the built in switch. When the motor reaches speed the manual switch is opened.

A current relay arranged to connect the starting winding during the high current starting period may also be used. It is placed in series with the motor and the high current at starting causes its contacts to close and connect the starting winding. When the current drops to normal its oil is deenergized to the point where the contacts open.

Failure of a repulsion-induction motor to pull in may be due to worn brushes or a defective necklace.

Contactors

Relays and contactors used in motor circuits are very dependable. Contact points should be kept clean using the finest abrasive that will do the job. They should be replaced before there is an appreciable loss of spring pressure due to wear.

Pole faces must be kept clean, particularly on a-c devices. Any foreign matter which prevents the armature from seating will cause buzz and overheated coils. Coils must be kept tight on the core to prevent movement when they are energized.

Coils that have become wet may be dried out the same as motor windings.

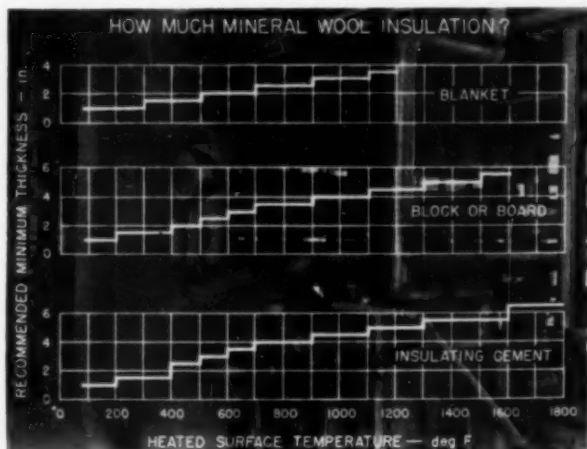
How Much?

INDUSTRIAL insulation pays for itself many times over in heat savings when applied to the proper thickness. Where it's too thin for the job you don't get the results you are paying for. Where it's too thick, you are buying more labor and materials than you need.

The type of insulating material, as well as the heated surface temperature, determines the proper insulation thickness. At temperatures from 70 F to 1800 F the chart gives the recommended minimum thicknesses of mineral wool in its blanket, block (or board) and insulating cement forms.

Commercial Standard CS117-49, "Mineral Wool Insulation For Heated Industrial Equipment," recommends these thicknesses for

indoor locations. Outdoors, add half an inch; underground, subtract half an inch. — INDUSTRIAL MINERAL WOOL INSTITUTE.



Men . . . Hours . . . Dollars

Ratio of Overtime to Straight Time is Important

*Overtime
Straight Time*

Demand for increased production and rising wage scales emphasize the urgent need for full utilization of industrial manpower.

STARTING with a one-industry survey as a basis, SOUTHERN POWER AND INDUSTRY is broadening its investigation of manpower utilization practices in the South and Southwest to include the other principal types of industry. In selecting those to be questioned, consideration is being given particularly to those industries with Southern plants that collectively employ a large number of men—and those industries that normally operate more than one shift per day.

From preliminary studies it seems that most benefit to these industries will come from collecting and presenting data on work scheduling—particularly shift scheduling and overtime practices. Therefore, the conclusions presented here are confined principally to consideration of the ratio of overtime to straight time.

The study, recently completed, brought out some rather interesting points; some admittedly controversial and others definitely and directly beneficial in controlling payroll. Since the data forming the basis for the study were obtained in confidence, we shall not refer to specific figures. However, the participating companies do not object to presenting the general findings.

The primary function of the study was to explore practicable

means of reducing payroll overtime charges for both Production Operation and Production Maintenance. Since it must be recognized that a certain amount of overtime payroll is necessary to operation and maintenance of any industrial operation, the study presents an effort to minimize overall payroll expense rather than merely reduce overtime payments. In other words, an effort is made to arrive at an economic balance for overtime payroll, normal payroll and total payroll.

It is not difficult to see the necessity for a balance when it is realized that all heavy maintenance for many operations must be accomplished within six months of the year or less. Since provision of stable, year round employment is generally recognized as desirable, the basic problem becomes one of evaluating overtime pay during the high period against the straight time payroll cost of carrying "extra" maintenance employees during slack maintenance periods.

To arrive at conclusions based upon data obtained, it is necessary that Operation and Maintenance be treated separately because there is a marked difference between the two.

Operation

So far as operation is concerned

rather definite conclusions may be drawn. Findings backed by the results of many previous studies, indicate that the lowest overall operation payroll cost will result from provision of $4\frac{1}{5}$ operators for each operating position requiring 24-hour attendance, plus one vacation relief operator per 25 regular operators (two-week vacation basis). This system provides that all operator lost-time relief will be on an overtime basis, and is the procedure employed in the majority of companies where plant operation is on a 24-hour 7-day week basis.

These findings are not difficult to rationalize when it is realized that the basic problem, so far as operation payroll is concerned, is to provide operator lost-time or sickness relief. For a 40-hour employee work week, each operating position requiring 24-hour attendance calls for $168 \div 40 = 4\frac{1}{5}$ operators (with no consideration given vacations). This $4\frac{1}{5}$ men per station completely eliminates overtime for relief.

Furthermore, the additional provision of one vacation relief operator for each 25 regular operators (two-week vacation basis) completely eliminates overtime from this second source.

It must be recognized that, in both schedule and vacation relief,

Comments Welcome

Operators, Personnel Managers, and Work Supervisors are invited to comment on the indications and suggestions presented in this first article on OVERTIME as it affects operating and maintenance economy. While the editors would prefer signed comments, so they can know the origin of the opinions, neither individual nor company names will be revealed in any of the comments or conclusions on this subject that may be printed in the magazine.

it is not always possible to provide relief operators in the exact ratios cited above. For this reason, there is always some operator slack time to be absorbed in overall operation payroll cost. Under this procedure, all operators are utilized to the fullest possible extent on a straight time basis. Thus, without operator lost-time due to sickness or other reasons, there should be no overtime payroll charges directly attributable to basic operating functions.

This, then, leads to the problem of operator lost-time because of sickness, etc. As stated before, the majority of the companies included in the study provide no sickness relief operators. In this case, since there are four regular operators assigned to each operating position, one of the four is always off duty. In event of sickness, the "off duty" operator in the corresponding position is called in, on an overtime basis, until the fourth operator returns to work. In essential details, this is the system employed by the majority of the companies contacted.

Several studies, based on actual time sheet and payroll data, have been made in the past of the economics of providing sickness relief operators versus overtime relief. In every case, economics has dictated continuation of the overtime system. These findings are easily rationalized when it is pointed out that no one can predict which operator will be sick, when he will be sick or how many operators will be sick at the same time. In order to fully provide for all operating positions, it would be necessary to employ only top-rated operators capable of working in any position. In addition, there is no reasonable means of determining how many sickness relief operators should be provided.

From another viewpoint, however, one concession must be

granted in favor of the sickness or extra-operator relief system practiced by some companies. This is that it provides a possible means of minimizing overtime in the case of loss of a top-rated operator, during the long period of up-rating operators from the lowest or starting position to the vacant position.

The argument in favor of "overtime" sickness relief is strongly supported by a comparison of operation payroll costs for non-supervisory personnel between the companies participating in the study. Comparison, both on cost per unit of product and a dollars per unit of installed maximum gross plant capability basis, shows that those companies providing no sickness relief operators are producing at substantially lower overall payroll cost. In these comparisons, due consideration is given variation in basic wage rates between the various companies. In addition, the companies showing the lowest overall payroll cost also show the highest ratios of overtime to straight time operation payroll.

While on this subject, it should be mentioned that apparently the most equitable basis for comparison of unit operating costs is that related to installed maximum gross capability, since operator attendance must be provided for all producing equipment regardless of whether the equipment is operated at maximum or minimum production rate. This basis eliminates the inequalities of comparison brought about by widely divergent load factors as related to production requirements. While comparison on the basis of cost per unit of output unquestionably gives a truer picture of actual production costs as related to profit from sales, it certainly clouds the issue so far as control of production costs is concerned. This, of course, is brought about by the fact that the Production Department of any company

has little if any control over production equipment load factor.

Two other sources of operation overtime payroll should be mentioned. For obvious reasons, however, neither offers any apparent means of elimination or even possible reduction. These are: operator attendance at safety and other meetings and provision of extra operators to take care of short duration emergency requirements.

A further, amply justified, source of operation overtime payroll is in connection with starting new production units. While additional operators, in most cases, receive classroom training and job training on similar machines, it is necessary that they actually take part in operation of the equipment to be placed in their care. Since this is a temporary function, it is obviously more economical to call in extra operators on an overtime basis for scheduled process starting and stopping operations. As an alternate, to provide required training, it would be necessary to start and stop the processes on each watch. Over and above this, it is always necessary that older, experienced operators be retained, on an overtime basis, during initial starting and stopping operations until new operators are capable of assuming complete responsibility.

Maintenance

The basic problem, so far as determining the optimum number of maintenance personnel to be employed is concerned, is arriving at a balance between overtime payroll during heavy maintenance periods and straight time payroll cost of carrying additional maintenance employees during slack maintenance periods.

Before proceeding with any analysis of maintenance payroll costs, the difficulties attendant to such an analysis must be outlined. As compared with operation payroll, maintenance payroll costs are loaded with intangibles. For instance, a processing unit may be operated or not operated; in either case it may be assigned a definite number of manhours and a definite yearly cost. On the other hand, the same unit might be maintained to almost any degree of readiness in a given year and thus maintenance manhours

and costs for a one year period would not necessarily reflect average yearly maintenance costs.

This discrepancy is particularly emphasized at the present time because of high demand on most industrial plants and the resultant necessity of temporary curtailment of regular preventive maintenance schedules by many companies.

Another important intangible is the difference in productivity of various maintenance workers. In other words, what does a manhour represent in terms of work accomplished. Still another intangible affecting maintenance payroll costs is unpredictable emergency production requirements. Often, this type of demand prevents maintenance work during regularly scheduled working hours and thus entails overtime. This additional maintenance cost, in most cases should be (but very often is not) evaluated against the additional unanticipated revenue obtained from sale of additional product. Consideration must also be given to the fact that there is always a certain amount of maintenance work which must necessarily be performed on an overtime basis.

In comparing maintenance payroll costs for non-supervisory personnel among the participating companies, it is found that those companies showing the highest ratios of overtime to straight time payroll also show the lowest overall maintenance payroll costs. Here again, comparison is made on the basis of dollars per unit of installed maximum gross capability since it is apparent that there is little if any difference in cost of maintaining a fully loaded plant as compared with a partially loaded plant.

Therefore, elimination of the inequalities brought about by widely divergent load factors provides a more equitable basis for comparison.

A further comparison on a man-hour basis shows that those companies having the lowest unit maintenance payroll costs also, quite naturally, show the lowest unit manhour figures. While this might indicate that these companies are performing less than the required number of maintenance manhours, consideration must be given to the fact that they substitute overtime manhours during heavy maintenance periods for extra maintenance personnel and, consequently, do not carry extra straight time manhours during slack maintenance periods. Of course, evaluation of quality of maintenance must be made by each individual company.

It should be further pointed out that any comparison of maintenance manhours involves both labor productivity and plant design and equipment. Ease of access and completeness of shop facilities play very important parts in lowering unit maintenance manhours. Provision of good modern machine tools and portable tools such as pneumatic or electric impact wrenches and portable pneumatic or electric hoists, always results in considerable savings in maintenance manhours and costs.

From the above analysis it is evident that no set rule may be applied for determining the optimum number of maintenance personnel for a given plant. Rather, this is something to be determined by each individual company more on the basis of experience than by comparison with other companies. However, it is apparent that any company show-

ing a yearly average ratio of overtime to straight time maintenance payroll of less than 20 per cent would do well to investigate the savings which might result from a reduction in maintenance personnel.

As a means of qualifying this statement, we can examine a hypothetical case illustrating the two possible extremes in the number of maintenance personnel to be provided for a given plant. The upper extreme would be to employ sufficient maintenance personnel to perform all heavy maintenance (assuming a six-month heavy maintenance period) on a straight time full year basis. It would be assumed that all of these men would be carried at straight time through the slack maintenance period. The other extreme would be to employ only sufficient maintenance personnel to perform the slack period maintenance work on a straight time basis. In this case, all additional manhours required for the heavy maintenance period would be provided on an overtime basis by the regular maintenance men who would be compensated for the extra hours at one and one-half times their basic rates. Simple calculation of the comparative costs of the extra work during heavy period will show a ratio of nine to twelve in favor of taking care of the extra work through overtime employment of the regular crew.

Obviously, provision of maintenance personnel under either of the two extremes cited would not likely be feasible. However, such an example does point out the fact that a sizable ratio of overtime to straight time maintenance payroll usually contributes to efficient utilization of maintenance personnel.

Mobile Training School for Diesel Mechanics

HERE is one of the new mobile Diesel service training units of the GMC Truck and Coach Division currently touring the nation to train 1,500 more GMC Diesel mechanics. During a recent stay in Atlanta, Georgia, 24 mechanics received full instruction in Diesel maintenance and repair.



ASME Spring Meeting—Atlanta

THE technical program scheduled for the 1951 Spring Meeting of the American Society of Mechanical Engineers in Atlanta, Georgia, April 2-5 offers a diversified group of technical subjects of interest to those responsible for engineering and production throughout the South and Southwest. Particularly applicable to Southwestern processing operations is an extensive seminar on cooling towers. The complete technical program is tabulated.

1951 Spring National Meeting and Region IV Student Conference, April 2-5 at Atlanta Biltmore . . . technical sessions on dual fuel firing . . . cooling towers . . . foundry operations . . . utilization of waste materials . . . textile operations . . . materials handling . . . metalworking . . . machine design . . . safety.

Secretary—Atlanta Section
Robert F. Haller
1603 Candler Bl., Atlanta, Ga.

National Secretary
C. E. Davies
29 West 39 St., N. Y., N. Y.

Technical Program—ASME Spring Meeting, Atlanta, Georgia, April 2-5, 1951

Monday, April 2

FUELS—Dual Fuel Firing

Multi-Fuel Burners: Their Application and Design by W. H. DECKER, Sinclair Refining Co.

The Use of Oil and Gas in Stoker Equipped Furnaces by J. A. HAYES, Combustion Equip. Div., Todd Shipyards Corp.

POWER—Symposium on Cooling Towers

Economic Factors in the Design of Cooling Towers, by A. R. LEBAILLY, Sargent & Lundy.

Comments on Cooling Tower Economics, by LOUIS ELLIOTT, Ebasco Services, Inc.

Selection, Operation and Maintenance of Industrial Cooling Equipment (Cooling Towers and Air-Cooled Exchangers, by HOWARD E. DEGLER, The Marley Co., Inc. Recirculation in Cooling Towers, by JOSEPH LICH-
TENSTEIN, Foster Wheeler Corp.

Operating Experiences with Cooling Towers in the Central Gulf Area, by H. G. HIEBELER, Houston Lighting & Power Co.

Problems Relating to the Operation, Maintenance and Chemical Control of Forced and Induced Draft Cooling Towers for Steam Electric Generation Stations, by V. F. ESTCOURT, Pacific Gas & Elec. Co.

Deterioration of Wood in Cooling Towers, by R. H. BAECHLER and C. A. RICHARDS, Forest Products Lab.

Production Engineering

What is Foundry Sand?, by DOUGLAS C. WILLIAMS, Ohio State University.

Sand Reclamation at the Eddystone Plant, by KARL S. HOWARD and CLYDE B. JENNI, Gen. Steel Castings Corp.

Production Engineering

Production of Cast Iron Pipe Centrifugally in Sand Lined Moulds, by KENNETH R. DANIEL, American Cast Iron Pipe Co.

Relationship Between Modern Foundry Methods and

the Quality of Castings, by FRANK R. ELLIOTT, Westinghouse Electric Corp.

Tuesday, April 3

JUNIOR MACHINE DESIGN—Education

Machine Design as a Career in Industry, by B. P. GRAVES, Brown & Sharpe Mfg. Co.

A Current Plan for Young Engineers, by E. W. O'BRIEN, Past President and Fellow, ASME and Managing Director, SOUTHERN POWER & INDUSTRY.

Textile

ASME Analyzes Textile Mill Modernization, by LESLIE A. RUNTON, M. T. Stevens & Sons Co.

An Analysis of Fiber Blending, by WILLIAM F. LEINWEBER, JR., Textile Equipment Corporation.

Power

Current Operating Results and Developments in Mercury-Steam Power Plants, by HAROLD N. HACKETT, Knolls Atomic Power Lab.

Mercury Boiler Treatment with Titanium and Magnesium Metal, by RICHARD C. REID, General Electric Co.

Natural Steam Power Plants in Italy, by GIUSEPPE DONATA, Westinghouse Electric Corp.

Wood Industries

The Mechanism of Wood Preservation and Wood Preserving Plants, by J. ALVIN VAUGHAN, Southern Wood Preserving Co.

The Nail, An Indispensable Fastener, by E. GEORGE STERN, Virginia Polytechnic Institute.

Materials Handling

Materials Handling in Distribution, by S. STOKES TOMLIN, JR., Shell Oil Co.

A New Approach to Determine Materials Handling Equipment, Requirements, by JAMES R. BRIGHT, Editor, "Modern Materials Handling."

Continued Next Page

Wednesday, April 4

Management

Department Store Engineering, by JOHN SPEAR, Rich's, Inc.

The Integration of Organization and Management, by ROBERT LIVINGSTON and DAVID HERTZ, Columbia University.

Textile

Cotton Fiber Properties—A Factor in Selecting Textile Raw Materials, by EARL E. BERKLEY, Anderson Clayton & Co.

Power—Fuels

Effect of Taper on Screw Thread Load Distribution by E. E. STOECKLY, General Electric Co.

The Steam-Generating Station as a Source and Sink for the Heat Pump, by JAMES A. EIBLING and BERT-RAND A. LANDRY, Battelle Memorial Institute.

Fuel Availability and its Influence on Boilers and Burning Equipment, by P. R. LOUGHLIN, The Babcock & Wilcox Co.

Machine Design

Determination of the Effective Strained Length of Standard Stud Bolts, by ROBERT S. SHERWOOD, Iowa

President's Luncheon

Paul H. Nichols, Chairman of the Atlanta Section, ASME will preside at the President's Luncheon on Monday noon, April 2. Mr. J. Calvin Brown, President of the national society will speak on "Engineering Manpower Developments."

Roy V. Wright Lecture

The Wright Lecture, scheduled for late afternoon, Tuesday, April 3 was established in 1949 in honor of Roy V. Wright, President of the Society in 1931. It is a tribute to his contributions as a citizen to the nation and his community and in recognition of the stimulus his leadership gave to all engineers in discharging the duties of good citizenship. Mr. Frank H. Neely (Member of ASME), Chairman of the Board, Rich's Inc., and Chairman, Board of Directors, Sixth District Federal Reserve Bank, Atlanta, Georgia, will speak. Dr. Blake R. Van Leer, President, Georgia Institute of Technology, will preside.

Management Luncheon

The Management Luncheon scheduled for Wednesday noon, April 4 will feature Frank F. Groseclose, Director, School of Industrial Engineering, Georgia

State College, and RICHARD C. DOVE, University of New Mexico.

Shot Peening as a Factor in the Design of Gears, by JOHN C. STRAUB, American Wheelabrator and Equipment Corp.

Management

Status of Scientific Management in the Southeast, by HOWARD P. EMERSON, University of Tennessee.

The Role of the Engineer in Area Development, by LLOYD J. HUGHLETT, Arthur D. Little Co., Inc.

Thursday, April 5

Management

The Application of Statistical Techniques in Time Study, by GEORGE WILKINSON, Paul B. Mulligan & Co.

Optimum Speeds of Translation and Rotation for the Visual Inspection of Cylindrical Surfaces, by E. PAUL DEGARMO and E. C. KEACHIE, University of California and A. L. DEHART, Monterey, Peninsular College.

Materials Handling

Economics of Material Handling, by JOHN B. DAY, Georgia Institute of Technology.

Application of Conveyor to Coal Mining Operations, by GEORGE C. MAPLES, Continental Gin Co.

Institute of Technology, speaking on "The Importance of Southern Industry to the National Economy." Cherry L. Emerson, Vice President of Georgia Tech will preside.

Junior Conference

With the Georgia Institute of Technology as host, the thirteen Southern Student Branches comprising Region IV will hold their annual conference simultaneously with the Spring Meeting. Technical sessions will be held on Monday morning and afternoon, April 2.

At the Junior Conference, scheduled for Tuesday morning, April 3, E. W. O'Brien, Past President and fellow, ASME, and Vice President of W. R. C. Smith Publishing Co., will discuss "A Current Plan for Young Engineers."

Annual Reception

Mr. William H. Ruffin, Pres., National Assoc. of Manufacturers and president and treasurer, Erwin Mills, Inc., Durham, N. C., will be the feature speaker at the banquet following the members and guests reception Wednesday evening, April 4. Invocation will be given by Dr. Blake R. Van Leer, Pres., Georgia Inst. of Technology and E. W. O'Brien, Vice President.

W. R. C. Smith Publishing Co. will act as Toastmaster. Reception 6:00 PM; Banquet at 7:00 PM.

Plant Tours

Inspection trips scheduled for the ASME Spring Meeting in Atlanta include the Buick, Oldsmobile, Pontiac Assembly Plant of General Motors Corp., Chamblee, Georgia; Hightower Textile Engineering Building of Georgia Institute of Technology; Southern Wood Preserving Company, East Point, Georgia; and the Atlantic Steel Company, Atlanta, Georgia.

Atlanta Section Host

The Atlanta Section, ASME is host for the National Society Spring Meeting. The Atlanta Section Chairman is Paul H. Nichols and Vice-Chairman, A. M. Dieters. Local Committees for the Spring Meeting are: Co-General Chairmen, Leslie F. Zsuffa and Claude L. Huey; Technical Events, Mario J. Goglia; Printing and Signs, Vincent F. Waters; Hotels, Frank E. Markel; Entertainment, Roger A. Martin; Plant Trips, Lucius L. Pitts; Information and Registration, Robert F. Haller; Publicity, William V. Bishop; Reception, John Rittelmeyer; Finances, John H. Dodd; and Ladies' Committee, Mrs. Paul H. Nichols.

To the owners or investors, your plant is a means for earning profits.

To labor, it is a source of employment.

To suppliers, it is a customer.

To Chambers of Commerce, it is a payroll.

To politicians, it may be a source of revenue or a field for the extension of regulatory powers.

To the consumer, it is the source of a product.

These varied opinions of an industrial plant's function are by no means inconsistent. However, the plant's real function is the **modification of materials.**

Regardless of its size or product, your plant consists essentially of an assemblage of mechanisms and structures which control the movement and energy relationships of certain materials. These materials enter the plant in one form and emerge from it in another. Parts of the structure which provide for personnel comfort, maintenance of records, etc., can be considered auxiliary.

The various metal surfaces which make up the plant are exposed to corrosive effects from two sources:

1. The materials handled in carrying out the process:
2. The incidental environment in which the plant is placed.

Process fluids occur in such bewildering variety that it can only be said that each industry, and in many cases each plant, must seek its own measures for the control of corrosion. However, many general precautions may be taken.

Defense Against Corrosive Attack

By **MARSHALL PARKER**

Consulting Corrosion Engineer
Houston, Texas

THE incidental environment to which the structures of a plant are subjected is composed of the atmosphere, soil and water. The latter includes water used for cooling, although this could be classified as a process fluid. However, the particular water used is determined largely by the location of the plant, as are the other two, rather than by the nature of the process employed.

The atmosphere must include all airborne particles, condensed moisture and dissolved gases. In an industrial area quite a variety of corrosives may be present, and the selection or formulation of adequate protective coatings can present some formidable problems.

The presence of the plant under consideration will introduce changes in the atmosphere. There will also be changes as new plants are added in the vicinity, or as processes are modified in any of the plants involved. The question of paint formulation must be a matter of continuing study. However, the primary present concern is with design factors.

Whereas paints and coatings are a maintenance problem with respect to atmospheric corrosion, they should be considered as a design problem with respect to soil corrosion, for the obvious reason that a coating once applied to a buried structure is depended upon to afford protection indefinitely, if this is at all possible. The possibility does not exist for repeated service tests in place, with replacement timed according

to service life obtained, until an economical solution is found by trial and error. A compensating advantage exists in that the corrosive characteristics of the soil, unlike those of the atmosphere, can be depended upon to remain substantially the same over extended periods of time. Another advantage exists in that cathodic protection can be applied subsequent to original construction, particularly if provision has been made therefor.

The conditions under which structures are exposed to corrosion by water combine the characteristics of the other two mentioned. The degree of accessibility of exposed surfaces (with the exception of the interior surfaces of pipes) is about midway between that of surfaces exposed to the atmosphere and to soil. Access can be had, but some interruption of plant operation is involved. Similarly, the degree of variability of the corroding medium is intermediate. The characteristics of the water may either remain constant over long periods of time or vary, although not often as irregularly as those of the atmosphere. Many water exposed surfaces—particularly those where heat transfer is involved—cannot be protected by coatings. Cathodic protection is applicable to a large portion of the surfaces exposed to water, and the scope of its applicability is increasing.

Design Factors

Foresight, properly incorporated into the original design,

can aid in the fight against corrosion, by directly reducing the rates of corrosion in various exposures; and by facilitating the application of other measures against corrosion. The design may be of assistance in both of these ways in two respects—materials and geometry.

Material choices influence corrosion directly, as different materials have different resistance to various media; but material choices, where metals and alloys are involved, also have a profound effect on the possibility of occurrence of galvanic corrosion—a form much more common than many realize.

Electromotive Series

Corrosion is a restorative process of nature. Very few metals

are ever found in the pure form in nature; they occur locked up in compounds, bound to other elements with varying amounts of energy.

In order to obtain the metal, energy in one form or another must be supplied to tear these compounds apart. Different metals require different amounts of energy; and, in general, the harder it is to get a metal, the harder it is to keep it—the more readily it will corrode back to its combined form or one very like it.

At one end of the scale, gold is a metal usually found as metallic gold; copper is sometimes found in nugget form; and both these metals have relatively high resistance to corrosion in a variety of environments.

Near the other end of the scale,

iron is almost never found uncombined, and iron rusts readily; magnesium never occurs in the free state, and corrodes even more readily; at the extreme end of the scale, lithium, found only in very stable compounds, and extracted therefrom only with difficulty, corrodes (burns) readily, rapidly, and violently.

This "scale" is known as the Electromotive Series of Metals; each metal is rated by the electric potential measured between an electrode of the metal and an electrode of hydrogen, in an electrolyte consisting of a solution containing ions of the metal in a specified concentration. If any two metals are placed in any conductive solution, there will be a potential between them. It will not necessarily be the difference

Six Techniques for Combating Corrosion

1. Substitution for the structure under attack of a more resistant material

From design standpoint this might be more accurately described as the selection of a properly resistant material . . . with established process, previous experience of users is most reliable guide . . . investigate any new materials . . . with new process, conduct pre-construction tests on all materials likely to be useful . . . laboratory scale tests extremely unreliable in predicting behavior of materials under service conditions . . . time element operates against the successful conducting of true service tests.

2. Substitution or modification of the corroding medium

Modification of corroding medium out of question where atmospheric corrosion is involved . . . however, take steps to prevent or mitigate pollution of air with industrial wastes . . . modification or substitution rarely practical with respect to soil corrosion . . . sand fill sometimes used in pipe trenches but not always successfully . . . quite commonly used under tank bottoms . . . always possible to avoid contamination of backfill with highly corrosive substances, of which cinders is a particularly aggressive example . . . large volume required frequently makes it impossible to condition cooling water, except when employed in closed systems . . . latter should always be conditioned, unless water of exceptional purity available . . . even under best conditions, removal of dissolved oxygen is frequently recommended . . . investigate possibility of modifying or inhibiting any of the process fluids.

3. Interposing barrier between corroding medium and the corroded surface

Typical barriers—paints, special coatings, metallic coatings and temporary films . . . clad metal, where surface metal is of considerable thickness, may be con-

sidered in classification 1) . . . paints (including varnishes, enamels, etc.) not permanent necessitating continual maintenance . . . choice of paint may be modified from time to time as conditions demand . . . geometry of structure influences cost of painting to such an extent that it should be seriously considered in original design.

Coating for underground structures cannot be easily renewed . . . selection and specification calls for careful consideration . . . same considerations apply to metallic coatings . . . in many applications, unsatisfactory coating may be protected by paint . . . although temporary films behave functionally as barriers, they are chemical in nature and are normally considered as treatment of corroding fluid.

4. Alternating conditions of the exposure

Rounding and smoothing of an inlet port may, by affecting turbulence in a stream of fluid, greatly decrease corrosive attack . . . avoid crevices and pockets in which substances may accumulate.

5. Cathodic Protection

Applicable to any metallic structure imbedded in soil . . . use widely accepted by pipe line industry . . . coatings paired with cathodic protection, combination considered most effective and economical total protection technique now known . . . application to structures exposed to corrosive water rapidly growing . . . supplanting many coatings . . . progress expected in prevention of internal corrosion in pipes . . . applicability of cathodic protection to corrosion by process fluids developing more slowly, individual cases requiring individual investigation.

6. Providing an excess of material to be corroded

In some cases, easiest and most economical approach . . . often not really a solution but procedure being followed in absence of a solution.

between their standard electrode potentials (this varies with the kind of electrolyte, its concentration, temperature, and several other factors) but will give some indication of the potential difference to be expected.

If these two metals are then connected by a metallic circuit, a current will flow, the initial value of which is determined by the potential difference and by the total resistance of the circuit. This flow of current will be accompanied by the solution (corrosion) of the metal from which current flows to the electrolyte. This will be the metal which stands lower in the electromotive series, and, in such a cell as described, it is known as the **anode**. The other electrode, which does not corrode, is known as the **cathode**. The rate at which the anode corrodes is proportional to the value of the current flowing, there being a constant for each particular metal, known as the **electrochemical equivalent**.

Variables

Any one or more of a large and varied number of things can happen to modify the initial value of the flowing current. Corrosion products may accumulate which are relatively non-conducting, thereby bringing about a great reduction in the initial corrosion rate. A film of hydrogen will tend to form on the cathode unless some agency is present which is capable of removing it in one way or another. The insulating value of this film may virtually arrest the process.

Avoid Dissimilar Metals

The design principle to be derived from these considerations is that of avoiding the use of dissimilar metals in contact, especially in a situation which will supply the electrolyte. Soil, water, any aqueous solution or even a film of condensed moisture may act as an electrolyte. In general, the more conductive the solution, the more rapid the rate of corrosion. Obviously, it is impossible to entirely avoid the use of dissimilar metals in contact but there are measures of control which can be easily used to mini-

mize the existing hazard.

Metals which lie close together in the series, that is, metals whose potentials differ only slightly, cannot set up a galvanic cell of much power. Dissimilar metals, regardless of the potential they may exhibit, cannot establish a corroding system if there is no contact between them. They cannot establish a galvanic cell without an electrolyte.

Case History

An example of the mitigation of a corrosion problem by using metals closer together in the electromotive series is the recent development of an aluminum alloy for internal combustion cylinder heads. The alloy formerly employed set up a galvanic cell with the cast iron of the cylinder block, and much corrosion was experienced around the cooling water ports. The new alloy contains a specified quantity of copper, with the result that its potential with respect to iron, in the coolants usually employed, is very nearly zero; hence, little or no galvanic corrosion. It is becoming common practice to install an insulating joint where a copper service line is connected to an iron or steel water main. Thus no current can flow, in spite of the potential difference between iron and copper, and the main is protected from attack.

Relative Areas

The damage to the anodic metal is not likely to be very great if its area is much larger than that of the cathode; a brass valve in a steel line will usually cause very little attack on the line. To reverse the proportions would be to court disaster.

The bronze pump parts in a deep water well do not often bring about serious corrosion of the steel casing, except in highly conductive water. When corrosive attack does occur under these conditions, the most obvious remedial measure is the worst—attempting to protect the corroding part—the anode—by the application of a coating. Such a coating is never absolutely perfect, and is always subject to damage in use. The total corroding current flowing

will not usually be much reduced by such coating, but it will be concentrated at the imperfections in the coating; the penetration rate will thus be greatly increased. Under these circumstances, a much better approach is to coat the cathode. If the coating is 95 per cent effective, the total corrosion is reduced 95 per cent and the remaining 5 per cent is still spread over the entire anodic area.

As a final example of the application of several principles in combination, the design of an effective system for combating corrosion in the tubes of a condenser or heat exchanger will be described. The first and most obvious step is the selection of a resistant alloy for the tubes themselves. Because of the fact that a heat transfer surface is involved, coatings cannot be employed. It is not too difficult to find a suitable material for the tubing—and often it will be a bronze of one composition or another. This, however, leads to difficulties, since the bronze is definitely cathodic with respect to steel, and, in water sufficiently corrosive to have caused trouble, will set up a galvanic cell capable of doing great damage to the steel, particularly to the tube sheet itself. It will merely shift the trouble elsewhere to make this of bronze, besides being more expensive than necessary. A very successful measure then is the installation, in the water box, of a set of anodes of magnesium, the size and shape of which must be determined by the space available. Magnesium is strongly anodic to both bronze and steel, and will corrode sacrificially, with the result that no significant attack will occur elsewhere in the unit.

The magnesium anodes in the water box cannot protect the interior surface of the tubes themselves, because the current in the electrolyte will not "throw" more than two or three diameters down the tube, but will rather flow to the nearer metal. It is for this reason that a combination system of resistant alloy for the tubes, and cathodic protection for the water box, must be employed.

Although it would be possible to mount the anodes so that they

would be insulated from the structure, and complete the connection externally through a wire lead brought out through a device similar to a spark plug, it is seldom considered necessary to make an installation so elaborate. Such a system would yield two advantages, however; the amount of current flowing could be regulated by the insertion of a resistance in the circuit, so as to afford no more protection than is needed, and thus gain maximum anode life; and current readings could be taken from time to time, so as to

predict the time for anode replacement. In general, though, such units may be opened from time to time for inspection, and an estimate of anode consumption made at these times will make it possible to schedule replacements as needed.

The application of cathodic protection to process fluids of various kinds, other than water, has not been developed to any great extent. In view of the tremendous success with which this technique has met in the protection of pipelines in soil, various structures

(drilling platforms, flumes, bulkheads, and vessels) in sea and brackish water, and tanks and similar vessels exposed to fresh water, it seems inevitable that it should be extended with comparable success to other fluids. It is true that individual cases will require individual study and investigation, for current densities and potentials vary widely with different metals, different electrolytes, different velocities, and different temperatures, but it is certainly not probable that the problems will prove insuperable.

\$79 Million Aluminum Plant—New Orleans

KAISER ALUMINUM & CHEMICAL CORPORATION has announced selection of the NEW ORLEANS, LOUISIANA, area as site for construction of a new 200,000,000-pound-a-year aluminum reduction plant and power facilities.

Carrying out big-scale expansions to produce more aluminum for national defense and essential civilian requirements, Henry J. Kaiser, president, announced that Kaiser Aluminum will invest \$79,000,000—entirely privately financed—in the following program:

Construction will be rushed immediately on the reduction plant with four pot lines, which will raise Kaiser Aluminum's capacity to a total of 540,000,000 pounds annually of aluminum pig.

The Corporation will construct its own power plant at the New Orleans area site. It will use natural gas as fuel in generating electricity, which is essential in large volume and at low cost to produce primary aluminum. United Gas Pipeline Company has entered a long-term contract to supply the new operation with natural gas from the vast Gulf Area fields in amounts up to 70,000,000 cu ft a day.

Kaiser Aluminum will open up its bauxite properties in Jamaica to supplement its present source of the basic raw material from which alumina will be made to supply the new Gulf Coast reduction plant and also its two reduction plants in the State of Washington. Development of the new source of bauxite ore in Jamaica, within a short shipping haul of the Gulf Coast, will include mining operations and the providing of port and shipping facilities.

The Corporation's bauxite plant at

Baton Rouge, Louisiana, will be expanded and modified to handle the Jamaican bauxite and to increase from 300,000 tons a year to 540,000 tons the production of alumina, the white powder chemical from which aluminum pig is produced. This will represent an 80 per cent increase in production at the Baton Rouge plant.

A 280-acre site for the new reduction and power facilities has been obtained on the Mississippi River, directly on deep water for ocean-going vessels. It is being bought from the New Orleans Terminal Company, a subsidiary of the Southern Railway within the New Orleans metropolitan industrial and population zone.

More than 1,000 persons will be directly employed at the reduction and power plants, and completion of the Baton Rouge plant expansions will bring employment there to approxi-

mately 700 employees, Mr. Kaiser stated.

Direct Kaiser payrolls in the New Orleans and Baton Rouge areas are expected to approximate \$6,000,000 a year, upon completion of presently projected expansions. Several million dollars annually will be spent in addition for purchases of supplies, transportation and other activities.

Intense speed will be put into the project with the goal of starting the first production of aluminum pig in the latter part of this year and of having all four of the reduction lines in operation by the middle of next year.

Kaiser Aluminum's reduction plants at Spokane, Washington, and at New Orleans will be respectively the second and third largest primary aluminum plants in the United States and the third and fourth largest in the world.

Kaiser Aluminum & Chemical Corporation's Baton Rouge, Louisiana dock and plant where bauxite ore is converted to alumina. Plant will be key supplier of raw material to Kaiser's new New Orleans reduction plant.





Helping the MAN IN THE PLANT

Guide-in Device for Cable Stringing

AS the average plant has a limited amount of cable stringing, the line rig is apt to be found shy of the professional devices that can so greatly speed up an otherwise tedious job.

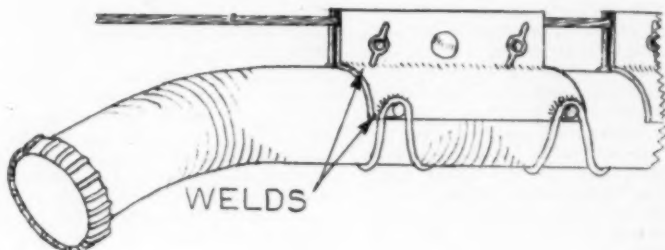
The illustrated device can be easily made up in the shop from a limited array of left-overs. Two, three bolt suspension clamps form the nucleus, and a section of 2½-in. conduit is cut into quadrants 8-in. long. One section is brazed to each half of the clamp to form a half of the saddle. Then ½-in. sections of cold rolled stock are welded at the saddle's edge to provide marine hitches or lugs.

Forty inches of 2½-in. "Greenfield" conduit is cut squarely and the ends protected against ravelling by brazing on bushings. Wing-nuts, substituted for the ordinary square nuts of the clamp bolts, speed up installation and dismantling.

Practice will soon determine how

much "lead" the Greenfield should have beyond the forward clamp to properly guide the cable into the lock-rings previously placed on the suspension strand. The angle that the reel of cable makes with the suspension strand, will usually determine the amount of "lead" necessary. Obviously the angle cannot be too severe since even the most flexible conduit cannot guide a cable from too acute an angle.

Ordinary liquid soap makes a wonderful lubricant to smear on the lead sheath as it leaves the reel. It washes out of gloves and clothing with ease and nature washes the cable off in the first rain.—PAUL C. ZIEMKE, OAK RIDGE, TENN.



Expansion Joints on Large Metal Vessels

LARGE heated metal vessels—boilers, tanks, towers, finishing ovens and furnaces—don't always remain the same size. During initial firing or shutdown appreciable expansion or contraction (with temperature change) is an unavoidable physical fact.

Unless precautionary measures are taken the insulation on such large surfaces will crack and buckle. It is useful, therefore, to know how to design expansion joints which will enable the insulating layer to expand and contract with the metal surface.

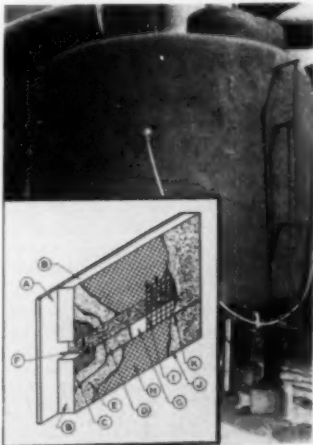
On equipment operating above 600 F., horizontal expansion joints should be provided at 12 to 16 ft intervals. As shown in the diagram, these joints consist essentially of 1½ to 2-in. wide furrows of loose

mineral wool, covered with protecting flaps of galvanized hardware cloth, between adjacent blanket edges.

The exact sequence of application of materials can be followed (from A to I) in the diagram, the width of the mastic and rosin paper strips (D and G) adjacent to the cleavage side of the furrow being 4 in.

The bottom edge of the hardware cloth flap (I) is left free to move up or down as the metal surface expands or contracts. Finally, after asphalt weatherproofing mastic (J)

is trowelled over the whole job, a line of cleavage (K) is struck at the lower edge of each expansion flap with the point of a trowel.—INDUSTRIAL MINERAL WOOL INSTITUTE.



Recommended procedure for installing mineral wool expansion joints on heated vessels as illustrated—A, heated surface; B, mineral wool blanket insulation; C, first ¼-in. layer of insulating cement; D, asphalt mastic strip; E, second ¼-in. layer of cement; F, loose mineral wool fill; G, rosin-sized paper; H, 1-in. galvanized wire mesh; I, 12-in. wide strip of 1-in. galvanized hardware cloth; J, asphalt mastic; K, line of cleavage.

how "Non - Clog" is a Non-Clog Pump?



this is your answer!



Phantom view of "bladeless" impeller. Arrows indicate direction of flow.

Any sewage and trash pump can be clogged! But the Fairbanks-Morse *Bladeless Impeller Pump* is up to 25 times more "non-clog" than any other pump. WHY?

A sewage and trash pump clogs because fibrous trash catches on impeller blades and eventually builds up to the point where the pump "clogs." But the Fairbanks-Morse Impeller has no blades! It's a "whirling tube" with no blades or projections to catch and hold trash. In tests, even a man's complete coverall went through a 4-inch pump without clogging. In actual operation, reports prove that the Fairbanks-Morse *Bladeless Impeller Pump* rarely has to be dismantled to clear "clogged impellers."

With previous pumps, they had to be dismantled as often as twice daily. If any pump can be called "non-clog," Fairbanks-Morse is it.

And a bonus advantage with Fairbanks-Morse: for a specific solids size, the *Bladeless Impeller Pump* delivers approximately 50% of the capacity of conventional sewage pumps. Thus, you do not flood filter beds in periods of low flow. This reduced capacity also permits use of smaller driving motors, assuring lower initial and operating costs.

Why not have your Fairbanks-Morse Pump Distributor or Local Branch Office give you the whole story? Or, if you prefer, write Fairbanks, Morse & Co., Chicago 5, Ill.



FAIRBANKS-MORSE,

a name worth remembering

PUMPS • SCALERS • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES

Bronze Turbine Runner Salvaged

In the course of an approach
 toward high-pressure water-
 jetting, it has been found that
 water, the hot, fast operation
 is more than 1000 psi. The
 immediate approach to the
 same, and so, to continue to
 serve, is now being used in
 a number of cases that they
 are so far, and, resulting
 with the use of, however,

[illegible]

Produce - lower - lower, as the
same, because the matter of the
structure will remain throughout
the life of the body. The structure
will, however, be the same
as the structure of the body
in the same manner.

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1. *Species*: *Thymus*
2. *Genus*: *Thymus*
3. *Family*: *Lamiaceae*
4. *Order*: *Lamiales*
5. *Class*: *Angiosperms*
6. *Phylum*: *Tracheophytes*
7. *Kingdom*: *Plantae*

[illegible]

1999

Regarding the crash was in fact very little in the same place as all were in the crash were several who in turn I have seen and the work area was thoroughly insured. The complaint to representatives of various insurance companies to register the crash site.

[illegible]

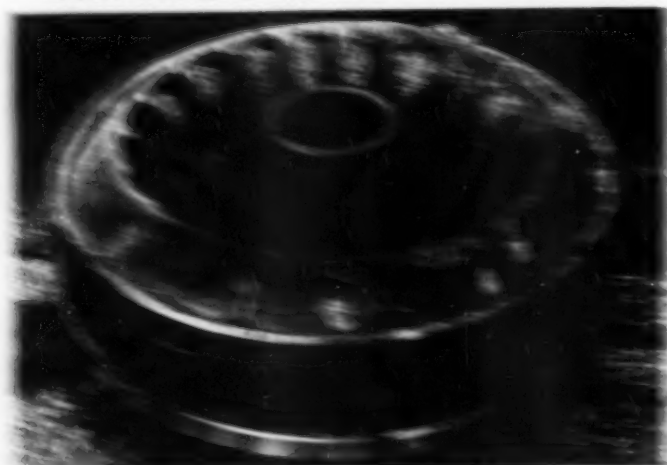
The first was a traditional ceremony in the park to welcome the young men to the city. The second was a parade in the main square. The third was a concert in the park. The fourth was a game of football in the park. The fifth was a picnic in the park. The sixth was a dance in the park. The seventh was a game of tennis in the park. The eighth was a game of basketball in the park. The ninth was a game of volleyball in the park. The tenth was a game of badminton in the park. The eleventh was a game of table tennis in the park. The twelfth was a game of chess in the park. The thirteenth was a game of backgammon in the park. The fourteenth was a game of dominoes in the park. The fifteenth was a game of cards in the park. The sixteenth was a game of darts in the park. The seventeenth was a game of pool in the park. The eighteenth was a game of snooker in the park. The nineteenth was a game of billiards in the park. The twentieth was a game of tennis in the park.

1. REASONING 2. REASONING 3. REASONING

As soon as the fire raged, the welder quickly applied a layer of steel from the end of a 3/8" rod of Chromalloy (355°F) and continued heating until the impurities on and inside the surface. Normally, this was quickly added and the north was used in low angle, a few feet from the center of the furnace. The process is a weld that creates a constant welding motion of the north was employed. Additional thin layers of alloy were built up on top of the first until the surface was completely flat. The welder slipped around from cracks in cracks to avoid building up heat in any one area. With the fire heating on the rod, it was not necessary to stop any additional for the time to stay near.

They were to use welding as welding between a steel to another was relatively easy in the open. A welder was a necessary element in the center of the ship work was completed.

The Commission is not aware of any other studies or information that would suggest that the Commission's findings are not representative of the general population.

[illegible]

1. The first step is to identify the problem. This involves understanding the situation and the goals that need to be achieved. It is important to gather all relevant information and to define the problem clearly.

Interim Coders:
47-4899:

THE SECRETARY OF THE ARMY OF THE UNITED STATES OF AMERICA, WASHINGTON, D. C. 20315, has received a letter from the Honorable Earl Warren, U. S. Supreme Court Building, Washington, D. C. 20540, dated 10/10/68, in which the Honorable Earl Warren has requested that the Secretary of the Army advise him of the status of the Army's investigation of the activities of the Honorable Earl Warren and his family, and of the results of the investigation.

The enclosed letter of
March 2, 1966, will be
sent to you by the
post office.

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.



85 years...young!

TIME AGES many things...but there's a "spirit" in the Southland that will never grow old!

It is as timeless as the courage and vision that enabled the war-ravaged South of 1865...alone and unaided...to lift itself "by its own bootstraps" out of the depths of destruction and despair.

It is as ageless as the optimism and faith with which the self-reliant, progressive men and

women of the South today are building toward an even greater Southland.

Without this spirit, the South could never have grown up. With it, our beloved Southland will never stop growing.

Proudly we say, "*The Southern Serves the South*"...because we are proud of the South we serve.

Ernest E. Norris
President



SOUTHERN RAILWAY SYSTEM

relatively easy of application but is not always completely successful because of the fact that some sources of air leakage inward will not always show up as water leakage outward.

If the condenser must be kept in service the most obvious initial move would be to narrow down the area to be searched by isolating with valves sections of connecting piping. For example the extraction heaters which are under vacuum would be cut out of service one at a time and the effect on air leakage noted.

If and when the area of search has been reduced to a minimum, all joints should be felt by hand and any joints which are cooler than their immediate surroundings are doubtless leaking because the air leaking into a vessel under vacuum expands and takes on heat.

Air leakage may be detected by sound if the sound is not drowned out by other noise. This suggests the possibility of using a stethoscope where the unaided ear would be unable to distinguish and definitely locate the sound of the leak.

Air leakage may be detected by a candle flame or oil torch flame being drawn in when brought close to the leak. This method is not effective for locating small leaks because the flame is more affected by local convection currents than by the leak.

If any valves are suspected of leakage and it is possible to expose the side of the closed valve farthest from the condenser, water can be used to detect leakage by flooding the body of the valve and noting the drop in water level.

For those suspected areas which cannot be checked easily by any of the foregoing methods, the following method has been found to be effective and practical. Carbon dioxide gas is released around the suspected area and the air ejector or vacuum pump discharge is checked for presence of carbon dioxide by means of an Orsat apparatus. This method was recently used to detect a leak through a turbine casing near one of the shaft seals.

A useful device for exploring for air leaks can easily be made up as follows:

A four foot length of soft copper tubing $\frac{1}{4}$ -in. O.D. is flattened at

one end to form a nozzle approximately $\frac{3}{8}$ in. long by $\frac{1}{64}$ in. wide. This tube is connected to a glass U tube or draft gage by eight feet of rubber tubing. The nozzle of the

tube is used as a probe to explore for leaks. Even a slight leak will be indicated on the U tube. This device can be used to greater effect than a candle flame.—T. M. JOHNS.

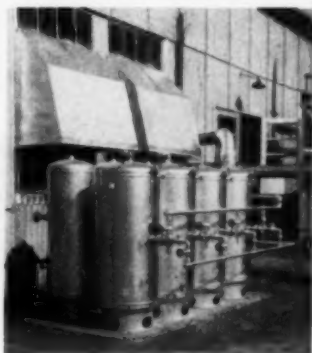
Mounting Air Tanks

IN a compressor station having upwards of 10,000 hp, in ten multi-cylinder gas engines, starting-air requirements called for the storage of sufficient air at 250 lb pressure to insure the starting of at least two of the units without allowing time for building up the compressed air reserve.

Instead of storing the air in one or two receivers, a battery of eight was selected, each of the tanks being mounted on end, and all manifolded together with individual valves so that any one might be cut out—or even removed, by blanking off the flanged connection to the tank—without affecting the serviceability of the others.

Using the shorter tanks than usual when setting them horizontally limited corrosion from condensed water to the bottom and top heads, as any drops forming on the sides tended to drain downwards without damaging the metal seriously. Corrosion protection was afforded the bottom head by coating with hard blown asphalt, which was spread by

tipping or rotating the tank while the base was carefully warmed to the melting point of the asphalt.



Use of the common fitting for incoming and outgoing air kept the manifold clean of possible condensation formed as the pressure dropped when drawing air for starting.

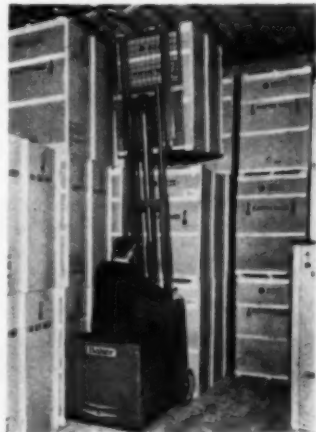
For utmost safety protection, each tank of the battery carried an individual safety valve and its own pressure gauge.—ELTON STERRETT, HOUSTON, TEXAS.

Storage Capacity Increased 33 Per Cent

IN the Florida warehouse of a large electrical parts manufacturer, storage capacity has been increased approximately 33 per cent with the aid of this Baker 1500 lb capacity fork truck. Some of the heavier appliances, weighing up to 410 lb, were too heavy and dangerous to tier more than two high by manual methods alone. These crated units are now tiered three high much more quickly and safely by one man.

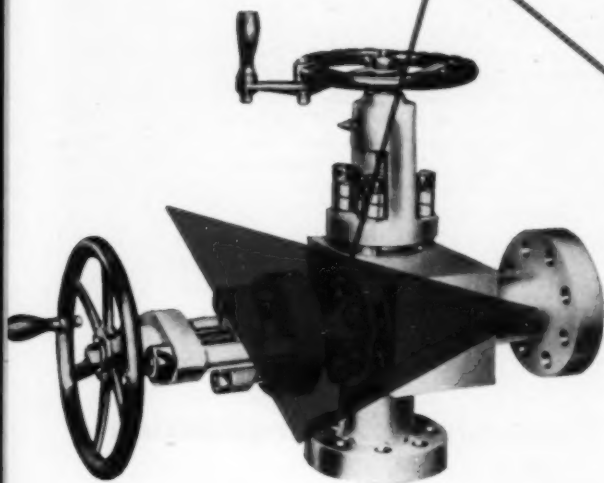
In addition to increasing the capacity of their warehouse, use of the highly maneuverable truck has made it possible to reduce aisle space about 25 per cent. Decrease

in damage to crated appliances has also been noted.



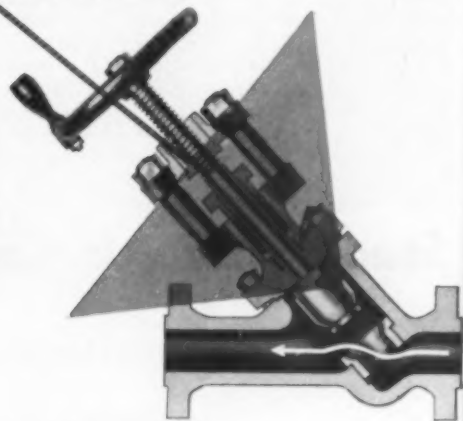
OVER 15,000 BOILER PLANTS USE THESE BLOW-OFF VALVES

MADE FOR EVERY PRESSURE



The Unit Tandem—Yarway's finest blow-off valve for high pressure service. Combines a Hard Seat Valve (for blowing) and a Seatless Valve (for sealing) in a one-piece forged-steel body, flanged or socket welding ends. Also available combining two hard-seat valves. For pressures to 2500 psi. See Bulletin B-433.

This is the famous Yarway *Seatless* Blow-Off Valve. Balanced, sliding, nitralloy plunger design eliminates seat—a common source of wear, clogging and leaking. Type B (above) for pressures 50 to 400 psi, angle or straightway, single or tandem. Other types available for higher pressures. Complete description and specifications in Bulletin B-424 for pressures to 400 psi, or Bulletin B-433 for higher pressures.



This is Yarway's Stellite-Seal Valve for pressures to 2500 psi. Shown here in open position. Disc and seat ring are stellite-faced and carefully mated for tight seating, long life and hard wear. Angle or straightway, single or tandem combinations (hard seat—hard seat or hard seat—seatless) available. Complete specifications and description in Yarway Bulletin B-433.

YARNALL-WARING COMPANY • Home Office: 116 Mermald Avenue, Philadelphia 18, Pa.

Southern Representative: ROGER A. MARTIN, Bonn Allen Building, Atlanta 3, Ga.

YARWAY

STEAM PLANT EQUIPMENT



Halting Heat Losses

MANY processes and steps in the manufacture of specialized items require the maintenance of certain temperatures and at the same time call for the removal of large volumes of fume-laden air. Frequently these fumes are corrosive, dangerous to the health or well being of plant personnel, or would damage the materials being fabricated, were they released at a point where re-entry into the plant would be possible.

Where stack venting is practiced to dilute and distribute the fumes far away from the plant and danger of contamination, much of the heat carried away by the exhaust air can be reclaimed and the problem of temperature control simplified if the intake air duct be built to surround the exhaust duct. If this latter be built up of thin-walled pipe and welded throughout, danger of fume leakage into the intake system is eliminated, and yet the heat transfer from the outgoing warm air to the incoming cold air—through the wall of the exhaust

duct—is little hindered by the pipe wall.

Along the Gulf Coast warming the incoming air is not a serious problem from a plant-heating standpoint, but raising the temperature of the replacement air even a few degrees greatly elevates the dew point, and sharply reduces the danger of condensation or sweating when the "fresh" air comes into contact with walls or work. Farther north, the saving in heat through duct interchange becomes more important. In one installation approximately on the 33rd parallel, it was found that proportioning the length of duct for interchange of heat on the basis of one foot of length for each inch of diameter of the exhaust pipe resulted in a temperature increase for the incoming air of about one half the differential between inside and outside air. Thus, with the desired working temperature of 70 degrees and an outside reading of 40 degrees, the incoming air would show at about 55 degrees,

leaving the remaining 15 degrees to be added through the heating system.

In the case cited the exhaust duct was made up from spirally welded pipe, with a very thin wall. Heat transfer was aided by welding on three more spirals of light metal, to extend about two inches from the pipe wall and to parallel the spiral weld already in the pipe. The duct in this installation was of (nominal) 20-in. pipe, with a sheet metal outside or intake pipe 30-in. in diameter centered outside it. Thus, roughly calculating the comparative areas of the two ducts, effective air area was about the same for outgoing, fume-laden air and incoming fresh air. As all the air for the department was brought in through the one duct, equal volumes were handled at approximately equal speeds by the two blowers, one for each duct.

To prevent a second transfer of the heat picked up from the exhaust stream through the outer wall of the intake annulus, it was insulated with one inch of magnesite plaster and protected against moisture—ELTON STERRETT, HOUSTON, TEXAS.

Study Your Air Conditioning Problem

Case Study Demonstrates Thoroughness in Engineering

By **A. S. FRIEDMAN**

St. Louis, Mo.

An auditorium building was to be air conditioned. After load was determined as 1800 tons, next step was to select equipment. Should ice be the cooling medium . . . Freon . . . Carbon Dioxide . . . Steam . . . Ammonia . . . Purchased brine line service?

ON the face of this problem several media were deemed impracticable but this would not satisfy manufacturers or dealers of the discarded types. So, in order that no segment of the air conditioning industry could say his medium had been neglected, all of the above were figured completely

as to installed costs and yearly costs with the re-heating system and with the by-pass system.

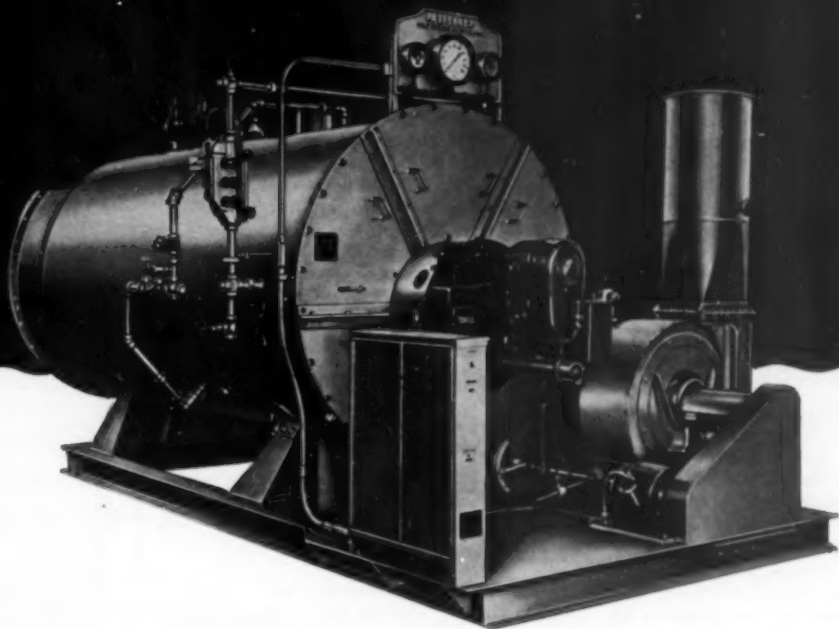
Condensing Water

Another phase of the problem that was carefully analyzed and included under each medium discussion was that of condensing

water. With each medium, where applicable, condensing water was considered (1) taken from the city water mains, run through condensers and water jackets to the sewer; (2) installation of a spray pond; (3) installation of several types of cooling towers and (4) by-passing the city mains and discharging the

*S*till leads the field

PREFERRED UNIT STEAM GENERATOR



IT'S A FACT—the finest unit steam generator costs the least over its entire life span. That's why Preferred has never lowered the quality of its product to lower the first cost. This accent on progressive engineering not only insures Preferred's leadership in its field, but also gives

you—the buyer—true boiler economy • Such features as the anti-stress deck, staggered tube construction and special precipitator are your assurances of at least 25 years of efficient, economical, maintenance-free service at a minimum efficiency of 80%.

Write for bulletin giving complete details.

PREFERRED UTILITIES MANUFACTURING CORP.

1860 BROADWAY, NEW YORK 23, N. Y.



warmed water back in the mains. With these water sources and uses had to be considered the critical temperatures of the refrigerants, the initial and final water temperatures and the flow of water required.

After the installed cost of each medium was determined the fixed charges of interest, amortization and depreciation were computed. To those charges were added the maintenance and operating costs so a complete picture was made showing the total costs of each of the various media considered.

Having the respective costs per year in dollars, additional steps were pursued showing the advantages and disadvantages of each medium.

Media Advantages

The advantages shown for various media included, where applicable: low initial investment; low fixed charges; low maintenance charges; flexibility of operations, for partial loads; non-use of dangerous or costly refrigerants; minimum amount of equipment re-

quired; small floor space required; maintenance of high efficiency at all loads; and continuous addition of pure water, in the case of ice, thereby maintaining a cleaner chilled water system at no additional cost.

Other advantages were simplicity of operation; lower operating pressure; lower cost of refrigerant for makeup; ease in detection of leaks; value of vapor pressure of refrigerant higher than atmospheric pressure at 0 degrees F. (thus eliminating entrance of air in the system); higher latent heat of refrigerant; high critical temperature of refrigerant; volume of gas refrigerant to be compressed; characteristics of refrigerant such as being odorless, non-irritant, non-toxic, non-poisonous, non-flammable, non-explosive, non-corrosive; horsepower per ton, availability of low cost steam; effect of this additional steam load on the overall boiler plant summer efficiency; absence of noise; absence of rotating or reciprocating machinery; and the high temperature of condensing water required.

Media Disadvantages

The applicable disadvantages listed the dependence of the movement of trucks and the accompanying traffic congestion, in the case of ice; dependability of steam supply; demand charge of pipe line service; hazard from fumes; higher cost of refrigerant for makeup; high suction pressures; high discharge pressures; care necessary to prevent leaks of refrigerant; low critical temperature of refrigerant; cost of equipment; floor space required; large amount of condensing water required; the high vacuum maintained making air-tight connections and joints costly; and the presence of rotating or reciprocating equipment with any attendant vibration or noise.

The assembling of all the information noted above satisfied each section of the air conditioning industry that his particular system or equipment had not been overlooked and also enabled the engineers to come to a logical solution of the problem.

Boilers for New Atomic Plant

RECEIPT of contract for four boilers for a power station to serve the new production plant of the Atomic Energy Commission has been announced by Combustion Engineering—Superheater, Inc., New York. This contract, according to Joseph V. Santry, president, is the largest ever placed for power station boilers. It was awarded by Ebasco Service, Inc., New York, consulting engineers for Electric Energy, Inc., a new organization which has been formed by five utility companies to build and operate the power station.

Outdoor Type Station

The new station is expected to cost between 85 and 88 million dollars and will be located near Joppa, Illinois. It will supply half the power requirements of the atomic energy plant and will be the first power station in the world to go into service with an initial capacity as high as 652,000 kw. A consider-

652,000 kw initial capacity of 85 million dollar outdoor type station. Each of four boilers to produce sufficient steam at 2150 psi to develop full 163,000 kw capacity of the generator.

able saving in time, cost and materials will be effected by using what is known as the outdoor type of construction. All principal components of the plant—boilers, turbines and auxiliaries—will be installed in the open, the only housed portion being a remote operating control room.

Boilers

The four boilers will rank with the largest in the world and will require 15,000 tons of steel for their construction. Equivalent in height to a 15-story building, each boiler will serve a single turbine-generator and will be designed to produce sufficient steam at a pres-

sure of 2150 psi to develop the full 163,000-kw capacity of the generator. The boilers will burn natural gas or pulverized coal, separately or in combination. Selection of fuel will be determined by relative cost since either fuel can be burned with maximum efficiency. When operating at full capacity with coal as fuel, the four boilers will consume 7500 tons (150 carloads) per day.

The station will utilize the reheat cycle with the steam reheated to 1000 F, thus achieving a substantial gain in thermal efficiency and a corresponding reduction in the amount of fuel used to produce a kilowatt-hour.



Cooking of the "World's Best-Tasting Cough Medication"
Is Automatically Regulated by

POWERS

Temperature Recording Regulators

They Save Labor—Help Insure Uniform QUALITY

For 104 years Smith Brothers cough drops have been famous for good flavor by seekers of cough relief. When Smith Brothers sought relief from the errors and losses of manual control of cooking operations they installed Powers Recording Regulators in their plants at Michigan City, Ind. and Poughkeepsie, N. Y.

When you want better temperature or humidity control for

AIR CONDITIONED process or packaging rooms
DRYERS, drying, curing or chilling rooms • COOKING tanks, vats, retorts
or kettles • WATER TEMPERATURE CONTROL—for every requirement

... contact your nearest Powers Office. There's no obligation. With 60 years of experience and a wide variety of self operating and pneumatic controls we may be able to help you select the best equipment for your requirements.

(SBCD)

Temperature Chart shown above indicates type of control obtained at Smith Brothers with Powers Recording Temperature Regulators.

At right: Powers FLOW-RITE Diaphragm Valve.



THE POWERS REGULATOR CO.

Over 55 Years of Pneumatic Temperature Control • Offices in Over 30 Cities • See Your Phone Book

CHICAGO 14, ILL., 3793 Greenview Ave. • NEW YORK 17, N.Y., 221 E. 40th St. • LOS ANGELES 8, CALIF., 1004 W. 8th St. • TORONTO, ONT., 170 Spadina Ave.
ATLANTA, GA., 530 Peachtree St. N. W.

NEW EQUIPMENT for Southern Industry

Speed Truck

E-1 KALAMAZOO MANUFACTURING COMPANY, Kalamazoo 24, Mich., has announced a new speed truck designed and built for fast handling of materials and products of any kind. It has a 2-cylinder 13 hp air cooled engine. The manufacturer states that it is highly maneuverable, having three speeds



forward and one reverse, rigid shoe-type internal expanding brakes, Timken equipped steering fork, pneumatic or U. S. Innacush tires. Its wheel turning radius is 64 inches. The deck loading area is more than 20 sq ft with space beside the driver's seat for long material.

The standard speed truck has a manual starter. The truck can also be furnished with 6 volt electric starter and generator. It is adaptable for use by railroads, shops, industrial plants, utility companies, foundries, and other activities where materials are transported.

Free additional information is available to readers of Southern Power & Industry. Check item number on the postage free service coupon post card—page 17.

Air Filter

E-3 AMERICAN AIR FILTER CO., INC., Louisville 8, Ky., has introduced a new high velocity unit air filter. It is made of corrugated strips of fine mesh wire in which the corrugations taper so that when two strips are placed together they form a series of pyramid shaped pockets. The small ends of the pockets are closed to the air flow to eliminate any open air passages through the media.

These filters are designed to operate at velocities up to 500 fpm and

Bin Valve

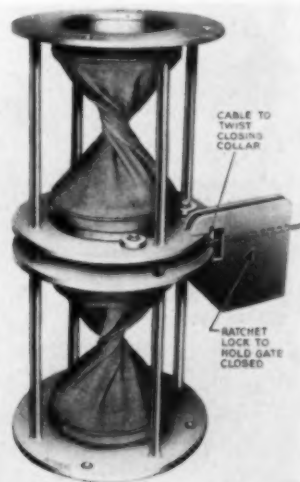
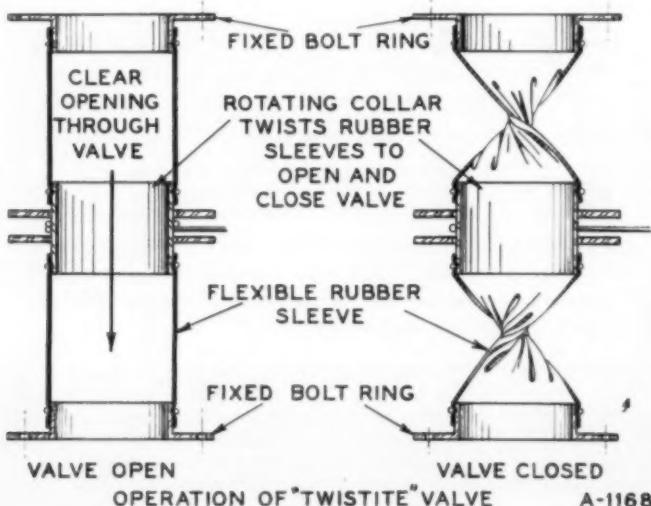
E-2 STEPHENS-ADAMSON MFG. Co., Aurora, Ill., is now marketing the "Twistite" double-closure bin valve consisting of two rubber sleeves joined by a rotating steel collar. Dust and drip-tight closure is obtained by pulling on a cable wrapped around the rotating collar, sealing the opening with a twist in each of the rubber sleeves.

The valve is self-opening, the elasticity of the rubber sleeves causing them to resume their cylindrical shape immediately when tension on the cable is released.

The valve can be hand controlled locally by mounting a ratchet lock on the valve to hold the cable in the closed position. Remote hand control can be obtained by mounting the ratchet lock at any desired location

and running the control cable to it by a simple pulley arrangement. The valve can be controlled automatically by use of a small actuating motor.

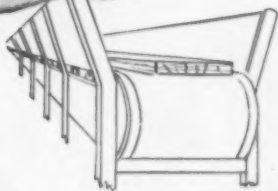
The standard 6-inch valve weighs 35 lb with the ratchet cable-lock mounted on the valve frame. It will handle lump sizes up to 2 1/4" and requires a 30 lb cable pull for closure. Other valve sizes are available on request.



"Republic Record Maker may be the right conveyor belt for your job, too. Give us a call and we'll soon find out. Republic Distributors like me make free analyses of every job. Our recommendations save you money."



"Proper maintenance can increase conveyor belt life more than 50%. We keep our Republic Record Maker Belt centered to avoid unnecessary edge rub."



Try Republic First...

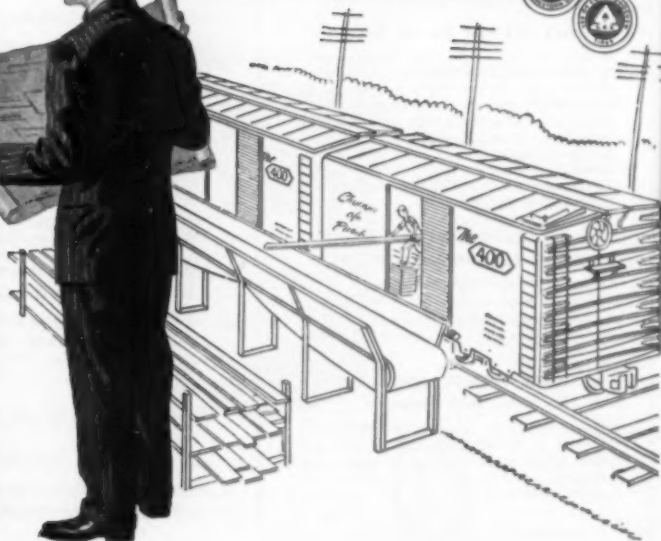
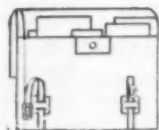
REPUBLIC CONVEYOR BELTS SAVE LABOR

"Our lumber company greatly reduced labor costs with Republic Record Maker Conveyor Belting. At one spot alone, where rough oak planks are unloaded from box cars, work efficiency has increased four times. The belt, in operation for more than 4 years, has long since paid for itself."

Republic Conveyor Belts eliminate hours of tough, unnecessary labor on the job. Republic Products, like the lumber-hauling Record Maker Conveyor Belt shown below, are made of quality materials especially chosen to give extra performance at minimum cost. Your Republic Distributor is an expert analyst who can quickly tell which of the hundreds of Republic Industrial Rubber Products is best suited to your line of work. Contact him today, or write us direct. Remember, for a half-century the Republic name has stood for performance through quality. For best results "Try Republic First!"

INDUSTRIAL RUBBER PRODUCTS BY REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation
YOUNGSTOWN, OHIO





*There's one man
who can help you
reduce expenses*

Eagle-Picher Insulation

can help you get maximum heat and power

from each fuel dollar expended

*Here's insulation
that will save you money*

EAGLE-PICHER DE-85 BLOCKS

A highly efficient, rigid-type insulating material composed almost entirely of pure, lightweight, Eagle-Picher Diatomaceous Earth. High physical strength enables these blocks to stand up under usage normally encountered in installation. Adaptable to virtually all types of heated equipment. Can be cut with a knife, or sawed, to fit irregular shapes. DE-85 Blocks for temperatures to 1300°F. DE-95 Blocks for temperatures to 2000°F.

**EAGLE-PICHER
"99" FINISHING CEMENT**

Finishing cement for temperatures up to 1000°F. Adheres tightly to hot or cold surfaces with practically no shrinkage. Highly durable. Gives a smooth, hard, light-colored, paintable surface.

**EAGLE-PICHER STALASTIC
(Boiler Wall Coating)**

Effectively seals against air infiltration through boiler settings—seals cracks and pores, effects substantial fuel savings. Great adhesive strength, retains its elasticity. For temperatures up to 400°F.

An Eagle-Picher Industrial Insulation distributor or representative can help you reduce operating expenses because he has available a wide line of insulation products—for high and low temperatures—scientifically designed for maximum thermal efficiency, and practical application. Why not let him give you more information about some of the products listed here?

These Eagle-Picher products can save you money... power... time

**Insulating Felts • Supertemp Blocks • Blankets
Loose Wool • Pipe Covering • Stalastic • Insulseal • Insulstic
Swatchek • Finishing Cements • Insulating Cements
Fireproofing Cement • Diatomaceous Earth Blocks**

THE EAGLE-PICHER COMPANY

General Offices: Cincinnati (1), Ohio

*Insulation products of efficient mineral wool—for a full range
of high and low temperatures. Technical data on request.*



Since 1843

*Get maximum
fuel savings and exact
temperature control
with these versatile,
efficient insulations*

For a completely effective, low-cost insulation combination, you can't beat the teamwork of Eagle-Picher Supertemp Blocks, Diatomaceous Earth Blocks #85 (for temperatures to 1300°F.) and DE Blocks #95 (for temperatures to 2000°F.), Eagle-Picher Super "66" Insulating Cement, and Eagle-Picher Insulseal. They work effectively to give your equipment the highest possible thermal efficiency . . . cut operating costs by saving maximum amount of fuel . . . and help to provide perfect, precise control over temperatures.



EAGLE-PICHER SUPER "66" INSULATING CEMENT

Super "66" is all-purpose, rust-inhibitive, extremely adhesive insulating cement. "Springy ball" pellets don't collapse after application . . . give great coverage, retain their thermal efficiency. 100 lbs. covers 65 sq. ft.—1 inch thick! Easily applied with trowel, over flat and irregular surfaces. Efficient for temperatures up to 1800° F. Reclaimable when used on equipment whose temperatures go up to 1200° F.



EAGLE-PICHER SUPERTEMP BLOCKS

Eagle-Picher Supertemp Blocks are lightweight (approximately 16 lbs. per cu. ft.). Can be cut easily with knife or saw to fit off-shaped areas . . . they fit snugly over minor irregularities. They're strong and have high refractory value. Withstand temperatures up to 1700° F. Conductivity at 512° F. approximately 0.43 . . . all standard sizes, from 3" x 18" to 12" x 36" . . . in thicknesses from 1" to 4".



EAGLE-PICHER INSULSEAL

A tough, weatherproof, protective coating for insulation. For temperatures up to 450° F. Applied as a plastic, its smooth troweling qualities assure uniform coverage, proper thickness. It protects insulation from air infiltration, fumes, rain, snow, vibration, punctures, and withstands severe service, indoors or out. Dries to a smooth, rich black, has a neat appearance on hot or cold surfaces . . . may be washed or painted.

THE EAGLE-PICHER COMPANY General Offices: Cincinnati (1), Ohio

Insulation products of efficient mineral wool—for a full range of high and low temperatures. Technical data on request.

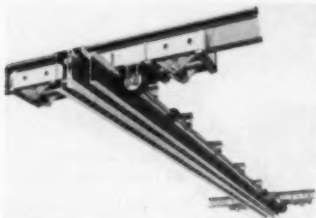


Since 1843

maintain a uniformly high cleaning efficiency over a wide range of air velocities. They can be serviced in the conventional way with washing and charging tanks or reconditioned by washing out the accumulated dust with a hose and spraying with filter adhesive.

Constant Service Crane

E-4 AMERICAN MONORAIL COMPANY, 13105 Athens Ave., Cleveland 7, Ohio, is producing a new constant service crane. New articulated trolleys carrying this



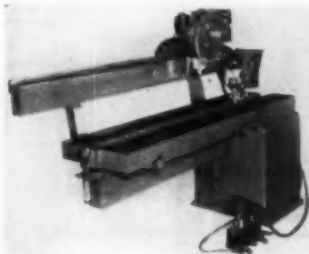
new crane are designed so that each wheel bears its full share of the load in alignment with the craneway tracks. All possible friction is eliminated by thrust bearings at all load bearing points, which is said to result in perfectly articulated trolley travel.

Two new methods of propulsion are available—fluid drive using the hydraulic coupling principle and a heavy gear drive consisting of slip ring motor with heavy duty gear reducer directly connected to the drive shaft. The new product, like all American MonoRail cranes, can be interlocked for carrier travel beyond craneway areas.

Arc Welder

E-5 THE CECIL C. PECK COMPANY, Cleveland, Ohio, has developed a welding machine with a wide range of applications. It is a standard seam welder for automatically welding seams in metal ranging from 14 gauge to ¼".

This universal horn type welding machine uses a "Lincolnweld" head

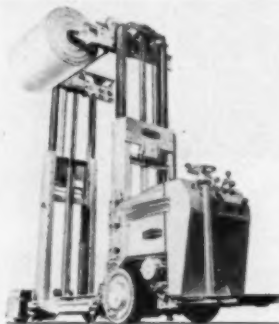


and carriage for automatic hidden arc welding. It is designed for welding cylinders or other hollow shapes. It can also be used to splice sheets and through-weld flanges in making containers. Work up to 18' long can be handled and the machine can be extended to take longer pieces. Minimum diameter is 12".

Typical applications where the machine is employed are hot water heater shells, air compressor tanks, furnace bodies and water softener tanks.

Materials Handling Equipment

E-6 LEWIS-SHEPARD PRODUCTS, INC. 256 Walnut St., Watertown 72, Mass., is marketing a new truck designed to handle 1500 lb rolls, 32" dia, 42" long, in and out of 5 high storage racks along both sides of 54" wide aisles. The truck services one room holding 1200 of these rolls and operates in complete darkness. A signal system built into



the truck lets the operator know the aisle and his position in the aisle as the truck moves along. Four hydraulically operated positioning pads prevent movement to the truck horizontally (while handling the roll in and out of the racks) and position the truck vertically so that rolls can be handled within the close tolerances required.

While traveling in the aisles between columns of rolls in racks the truck is steered by guide rollers running against the side of the aisle tracks. In all other places the truck is steered manually. Electric storage battery power moves the truck and runs the hydraulic pumps which control all other motions of the truck.

Once the truck reaches its position in the aisle a few controls are set and the carriage automatically starts to raise to the proper level, move sideways, pick up or deposit a roll, return to the center position where the carriage lowers to a normal position.

Fork Lift Truck

E-7 MOBILIFT CORPORATION, 1135 S. W. Yamhill St., Portland 5, Ore., has announced a new "Tier-Master" fork lift truck with telescoping uprights low enough



to enter a motor truck van body, yet with a lift that will tier merchandise and materials three pallets high.

This new model is 72" high with the mast lowered but will lift 117" from floor to forks. The overall height of the mast extended is 142". It is designed to tier 3 pallets high and still move in and out of trucks easily.

The "Tier-Master" is a stand-up type, 2000 lb capacity fork lift truck with an outside turning radius of 57 inches and a zero inside turning radius. It is powered by a 3 cylinder air-cooled, gas operated engine.





TOUGH LAYOUTS

- ✓ Assured Safety
- ✓ Efficient Operation
- ✓ Minimum Fuel Costs
- ✓ Low Maintenance
- ✓ Long, Trouble-Free Life



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The high degree of skill acquired by Navco Engineers from long experience in solving unusual Piping problems is your guarantee of an accurate and workman-like Piping System.

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Timing Belt

E-8

UNITED STATES RUBBER COMPANY, Rockefeller Center, New York 20, N. Y., is producing a rubber and fabric belt with teeth known as the Gilmer Timing Belt. It will attain speeds up to 16,000 fpm, and can be used as a functional part such as a synchronized conveyor as well as for transmitting power. The manufacturer recommends it for use with portable tools, chain saws, high speed pumps, automatic screw machines, and other industrial machinery.

The belt requires no lubrication. It is unusually compact and speed ratios up to 30:1 are said to be possible with it. Its extreme flexibility permits pulley diameters as small as one-half inch at 10,000 rpm even with a heavy load. According to the manufacturer, maintenance costs are low because of the absence of take-up mechanisms, elimination of lubrication, and elimination of power waste.

Gaskets

E-9

FLEXITALIC GASKET COMPANY, Eighth and Bailey Sts., Camden 5, N. J., is now producing gaskets designed for maintaining perfect seals for boiler handhole and tubecap cover assemblies at a minimum maintenance cost.

The new gaskets require no compounds and can frequently be reused if not removed from cover assemblies during outage. They are available in two thicknesses: .125" for use with assemblies having narrow seating surfaces and high bonding loads; .175"



for use in assemblies having broad seating surfaces and low bonding loads.

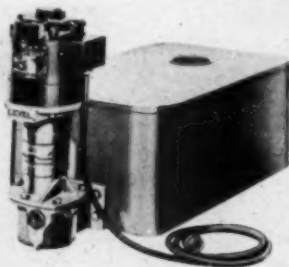
Design factors include: yield values and bonding loads proportioned to safe stresses of cover assemblies; resiliency under concentrated and fluctuating loads; exceptionally long and sustained service, and reduction of seat cleaning time.

The gaskets are available in the following three ranges of operating pressure for practically all makes of boilers and auxiliary equipment: 0-499 lb; 0-999 lb; 1000 lb and above.

Coolant Equipment

E-10

DELTA POWER TOOL DIVISION, ROCKWELL MANUFACTURING COMPANY, 600 East Vienna Ave., Milwaukee 1, Wis., has developed a low cost "Delta-Milwaukee"



kee" coolant pump and tank for use on most wet machine tools. A single unit meets the needs of a multiple-spindle drill press up to 8 spindles.

The pump is of the centrifugal type and is mounted directly to the tank with a flat machined flange—no piping is required from the pump to the tank. A six-bladed impeller is connected directly to the motor shaft. Several pump models are available, delivering from 6 to 32 gpm.

The ¼ hp motor is fully enclosed. It is mounted directly on the pump shaft. Ball bearings are double sealed and lubricated for life.

The tank has a 16 gallon capacity. A settling basin and wire-mesh screen keep coolant free of chips.

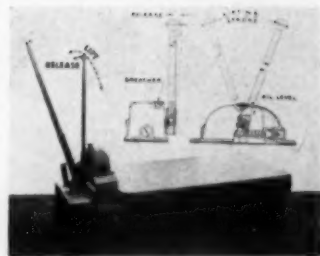
Further information is available from the manufacturer.

Hydraulic Pump

E-11

MARKET FORGE COMPANY, 80 Garvey St., Everett 49, Mass., is producing the new Marforge Lightning Load-Lift with an aluminum single-unit oil tank and pump combination. The hydraulic fluid is contained in the unit above the dual pumps. This allows the fluid to circulate by gravity.

The new Load-Lift is equipped with this heavy duty pump as well as with self-sealed ball-bearings, greased for life. A double ball-bearing fifth wheel allows the unit to steer easily with any handle position, and to get into narrow aisles. The lifting and lowering mechanism is completely separate from the pulling handle.



Modern arc-welded frame construction with smooth, rounded corner and edges gives streamlined simplicity and safety. The manufacturer guarantees the equipment for 20 per cent overloads.

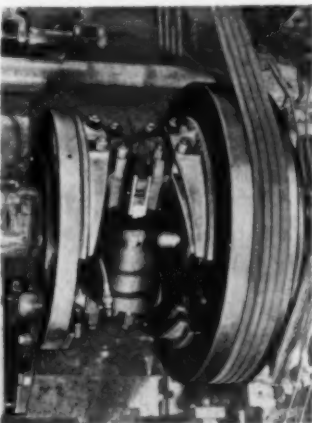
Clutch and Brake Unit

E-12

POWER PRESSES, INC., 615 Penton Building, Cleveland, Ohio, have developed a new combination friction clutch and brake unit, air powered, for the driving of medium and heavy machinery.

Accessibility is the primary feature of the new clutch. The manufacturer states that major savings in downtime and maintenance labor are effected by the facts that (1) Shoe and lining assemblies can be changed in minutes; (2) Such changes may be made without removing the unit from the machine; (3) All other wearing parts—driving mechanism, pistons, piston packings, springs—may be removed while the clutch is mounted on the machine, without the use of special tools and without the necessity of removing other parts.

The unit can be used on presses of all kinds, power shovels, wire drawing equipment, slitters, oil rigs, and paper, oil, rubber and rolling mills. It is available also in single clutch and single brake units.

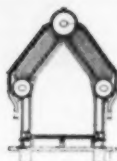


If you need steam

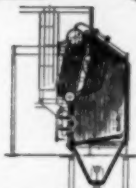


you need a Wickes steam generator

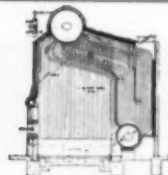
WICKES



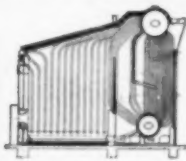
"A" Type Water Tube Boiler



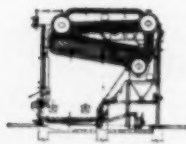
Type "R" Water Tube Boiler



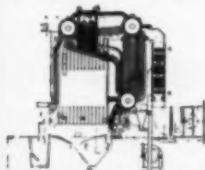
Type-S 2 Drum Boiler Series 51



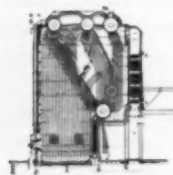
2 Drum Water Tube Boiler



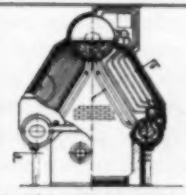
3 Drum Low Head Water Tube Boiler



3 Drum "B" Type Water Tube Boiler



4 Drum Water Tube Boiler



N₂ Oil Fired Marine Service Water Tube Boiler

Wickes Steam Generators are in constant daily service in thousands of installations throughout the world. Wickes can fill your exact requirements for boilers of any type up to 250,000 lbs. steam per hour and 850 psi. • Wickes Boilers are engineered for use in oil, chemical, paper and many other industrial uses as well as marine service. Our knowledge of steam generation is available for your consultation, without obligation.

Descriptive literature available upon request.

• Remember — If you need steam you need a Wickes Steam Generator.

THE WICKES BOILER CO.

SAGINAW, MICHIGAN

SALES OFFICES: Atlanta • Boston • Chicago • Cincinnati • Denver • Detroit • Houston • Indianapolis • Los Angeles • Milwaukee • New York City • Pittsburgh • Saginaw • San Francisco • San Jose • Springfield • Seattle • St. Louis • Tulsa • Mexico City • Buenos Aires • Manila • Havana • Montevideo • San Juan, P.R. • Victoria, B.C.

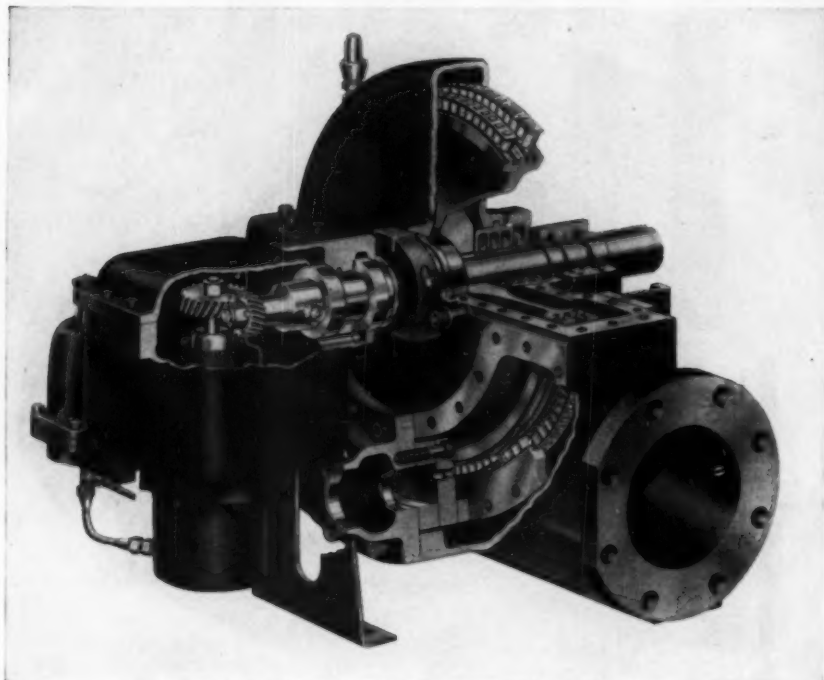
DIVISION OF THE WICKES CORPORATION
RECOGNIZED QUALITY SINCE 1854



131

103

Now More Than Ever . . . ***YOUR BEST TURBINE***



DP single-stage turbines are rated from 10 to 1200 hp, 1000 to 5000 rpm



Type

DP

Since the introduction of the DP turbine, more than two years ago, General Electric has been telling mechanical-drive turbine users that their best turbine buy was a *standard* design, wherever it could be properly applied. Nowadays, with the emphasis on increased output, the advantages which turbine standardization offers are even more important.

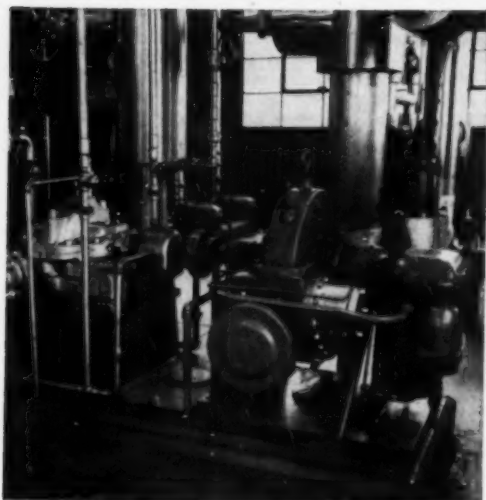
Standardization means that turbines of different rating and size have mostly identical construction features. This speeds delivery, cuts manufacturing costs, makes possible a better design and a better turbine. If you're not familiar with the General Electric DP, we suggest that you contact your nearest G-E sales office or send for a copy of bulletin GEA-

4955, "A New Standard in Mechanical Drive Turbines." Write to *Apparatus Dept., General Electric Company, Schenectady, N. Y.*

GREATER RELIABILITY

From its totally enclosed governor to its durable babbitt-faced bearings, General Electric's DP turbine is built to provide greater productivity through greater reliability. Standardization has made possible "extras" such as pressure lubrication, Monel-sprayed shaft, self-positioning packings, a totally enclosed hydraulic governor. You can count on your DP for safe, dependable service in hazardous atmospheres and on tough, continuous-process assignments.

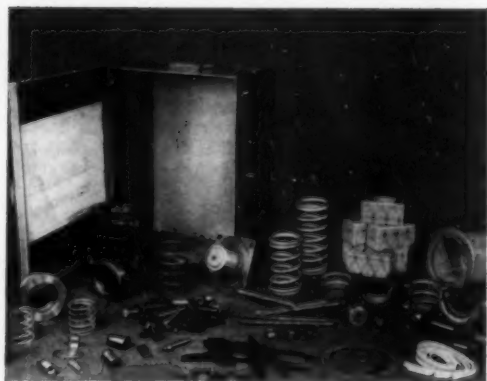
DRIVE IS A STANDARD



This DP drives a centrifugal pump in a refinery

WIDE APPLICATION FLEXIBILITY

In plants which require shifting of equipment from job to job, a standard DP frequently eliminates the need for extra drives. Because most parts are identical for all ratings, speed range and shaft horsepower can be easily and economically changed to fit new conditions. Though the DP's 30% adjustable speed range is usually adequate, a new range can be set anywhere from 800 to 5000 rpm simply by substituting a new emergency governor and governor gears. A change in horsepower rating usually requires a new nozzle plate and a few valve parts. These parts are all available on immediate delivery and save the expense of a new turbine which would be required with a less flexible, non-standard unit.



Standard spare parts kits are available with all DP turbines

EASIER, QUICKER MAINTENANCE

Because most parts of standard DP's are interchangeable on all models, spares can be easily stocked, and maintenance work handled quicker. You can have delivered with the turbine a 91-item spare parts kit, sufficient to service several machines. Socket-head cap screws are used throughout for quick disassembly. Standard shaft height, keyways, and coupling fits simplify installation. You can move DP's from job to job without change in the base structure.

GENERAL

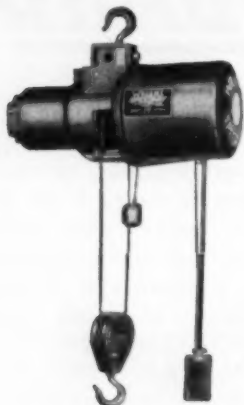


ELECTRIC

252-49

Electric Hoist

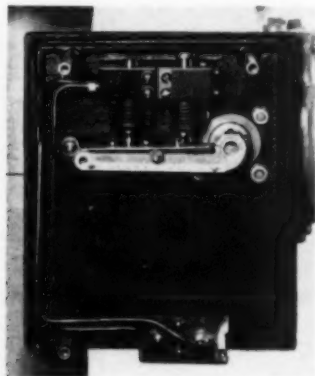
E-13 WRIGHT HOIST DIVISION OF AMERICAN CHAIN & CABLE COMPANY, INC., Bridgeport 2, Conn., has announced a new line of electric hoists.



Available in capacities from 250 lb to 1000 lb, these hoists are basically the same as the company's previous models, but are made with a shorter, deeper drum and are lighter and better balanced. They are said to be ideal for hook suspension. As the highest capacity offered is 1000 lb, these hoists use two parts of 3/16" Trulay cable, a smaller load hook and a smaller trolley. They have shaved gears and lower limit switch is standard equipment.

Level Detector

E-14 MINNEAPOLIS - HONEYWELL REGULATOR CO., BROWN INSTRUMENTS DIVISION, Wayne & Roberts Ave., Philadelphia 44, Pa., have developed a new displacement type detector and transmitter utilizing a bellows seal, to provide more precise and sensitive con-



trol of liquid levels. According to the manufacturer, this new detector meets many liquid level problems in the chemical, petroleum, food, paper, and other process industries.

The unit comprises two sections—a detector unit and a force balance transmitter. A welded steel detector cage is connected to the vessel in which the level is being measured. A stainless steel cylindrical displacer within the cage has fastened to its upper end a rod which extends outside the cage through a stainless steel sealing bellows.

The instrument has the following specifications: Ranges—0-14, 0-32, 0-48, 0-60, 0-72, 0-84, 0-96, 0-108, and 0-120 inches; pressure ratings—300 and 600 lb; material—cast steel displacer cage. Stainless steel displacer is standard. Brass, monel or plated displacers are available on application.

Flow Regulating Valves

E-15 THE SWARTWOUT COMPANY, 18511 Euclid Ave., Cleveland 12, Ohio, has announced a complete line of flow regulating valves. The units are designed



to handle steam and water at high pressure drops, and especially flashing condensate. Uses include drainage for stage heaters, evaporator coils, flash tanks, process systems, subcooled heaters, boiler blowdown, feed pump recirculation, and other service conditions where high-velocity impingement causes frequent maintenance or complete valve replacement.

Internal parts of the valve, seat, disc and long guide sleeve are made of stainless steel which has been heat treated and ground to precision fit. Valve design eliminates direct impingement and resulting corrosion-erosion effects.

The valves are supplied in seven

pipe sizes ranging from one to four inches. All sizes can be furnished in 150 to 600 psi standards; 900-1500 and 2500 psi standards are also available.

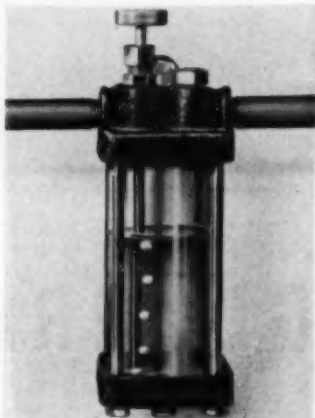
Bubbler and Sediment Trap

E-16 KING ENGINEERING CORP., Box 500, Ann Arbor, Mich., have developed two new units for use in gas and air lines: (1) the King sight feed bubbler, to control and visually indicate relatively small rates of flow; and (2) the King sediment trap for removing dirt and moisture from the line.

With the Bubbler, the entire flow of gas or air is passed through liquid in a transparent cylinder, where the rate of flow is shown by the bubbles rising through the liquid. Any desired liquid may be used. A needle valve at the top permits selection of any rate of flow from less than one bubble per second to approximately 20 cfm. Typical applications include bleeding air into lines to purge them of corrosive fumes, and use with hydrostatic liquid-level gages to control and show the flow of compressed air required for continuous gaging.

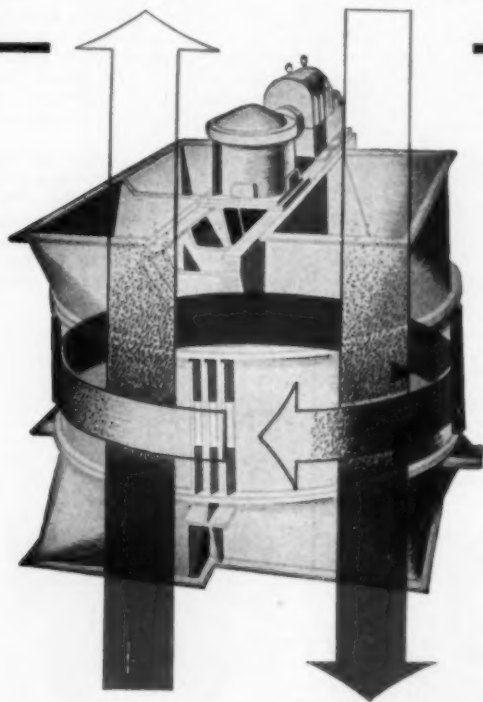
The sediment trap is identical to the bubbler, except that it does not have a needle valve, dip tube or filler plug. This unit handles a maximum flow of approximately 6 cfm at 25 psi differential pressure.

Both units offer a drain plug at the bottom which permits easy removal of excess liquid built up by condensation of moisture in the gas or air. Both units may be mounted on front of panel or supported in the line by the inlet and outlet pipes. Inlets and outlets at the sides and rear give a choice of 4 piping connections. Full details are given in illustrated Bulletin EX285, available from the manufacturer.



more than 200,000,000 lbs/hr of
post-war steam generating capacity

equipped with *Ljungstrom*
AIR PREHEATERS



Here indeed is impressive evidence of the wide acceptance of the Ljungstrom air preheater. Since the war the total capacity of steam generating units equipped with Ljungstrom air preheaters, installed, under construction or on order in industrial and utility plants throughout the country comes to well over 200,000,000 lbs of steam per hr.

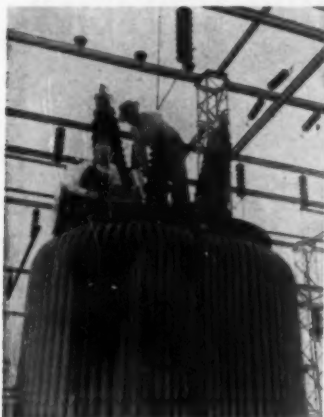
The reasons for the steadily increasing preference for the Ljungstrom air preheater are simple enough. The continuous regenerative counterflow principle assures maximum heat transfer with minimum weight and size. Flexible and compact, it may be used in a wide range of applications. Its proven reliability and low maintenance eliminate costly shutdowns.

If you are planning to build a new plant or modernize an old one, investigate the possibilities of the Ljungstrom. The specialized experience of Air Preheater engineers is at your disposal, to aid in effecting the most economic heat recovery from flue gases.

The Ljungstrom operates on the continuous regenerative counterflow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves the heat is transferred from the waste gases to the incoming cold air.

THE AIR PREHEATER
60 EAST 42d STREET • NEW YORK 17, NEW YORK
CORPORATION

Instrument News



SOUTHERN UTILITY USES "TTR" TRANSFORMER TURN RATIO TEST SET

It is a routine practice of Duke Power Company to ratio power transformers when they are being conditioned for service.

Recently a bank of power transformers being moved to a new location were given a routine check with the Biddle TTR Test Set. The test indicated a fault in one of these transformers. Investigation revealed several shorted turns on the primary. Since the fused turns were not grounded the transformer had operated for some time without failure but with an unbalanced voltage and circulating current in the delta. Having discovered this fault with the TTR Test Set it was possible to repair the transformer without excessive cost or interruption of customer service.

The Biddle Transformer Turn Ratio Test Set is simple to use in the field and insures quick, easy, highly accurate readings. Operated by one man, it is completely self-contained, including 8-volt hand generator, test leads and clamps. Look into this excellent instrument investment and the savings it will mean to your company. Your request will bring by return mail *Bulletin 55-SP*.

Here's the NEW BIDDLE IMPULSE CABLE FAULT LOCATOR

NOW RATED UP TO 25 KV.
WITH THESE
IMPROVEMENTS

HIGHER VOLTAGE—25 kv. increases its usefulness for proof, repair, and service tests on cable installations with voltage ratings up to 15 kv., as well as in cable fault locating.

IMPROVED PERFORMANCE OF DETECTOR—new techniques resulting from field experiences.

CURRENT MEASUREMENTS NOW INCLUDED FOR PROOF TESTING—permitting the measurement of leakage or incipient fault current during proof testing; helps to determine the condition of cable and other electrical equipment.

MEETS NEEDS FOR LOCATING FAULTS—on duct-installed cable up to 34.5 kv.

The Biddle Impulse Cable Fault Locator was developed primarily for locating faults on lead-covered cable installed in ducts. It has applications also on aerial and buried cable, and has proved highly effective in utility and industrial service. In operation, the set is essentially independent of the fault or its apparent resistance, and depends only on the impulse voltage required to break down the fault.

Equipment now in use in various industries has scored high in fault locating. *Keep in touch with us on Cable Fault Locating*—we will gladly consider your problems and give you full benefit of our own progress, development and experience.

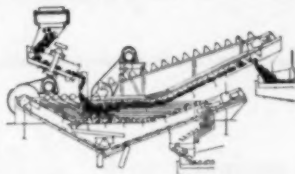
For complete information, write for *Bulletin 65-SP*.



New Biddle Impulse Cable Fault Locator

Coal Cleaning System

E-17 McNALLY PITTSBURG MANUFACTURING CORP., Pittsburgh, Kan., has acquired patent and manufacturing rights for the Tromp Heavy Density Coal Cleaning



System. The system is widely used for cleaning of the more difficult low-gravity as well as extremely high-gravity coals, with or without magnetic media.

Portable Welder

E-18 GENERAL ELECTRIC COMPANY, Schenectady 5, N. Y., has announced a new silicone-insulated, portable, a-c welder, equipped with automatic control. The silicone insulation is unaffected by high temperatures and is water repellent.

Instant arc striking without any manual adjustment is provided by "Hot Start" automatic control. The correct amount of boost is furnished for any specific current setting. The ampere range is covered by three overlapping current ranges which permit precise current control.



Compact construction—17" in diameter, and 35" in height—permits utilization of underbench space not available to larger welding units. The equipment can be used for welding light or heavy materials. It is mounted on a running gear for portability.

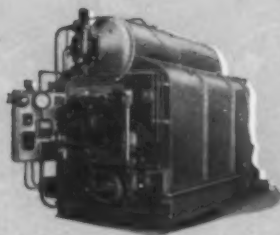
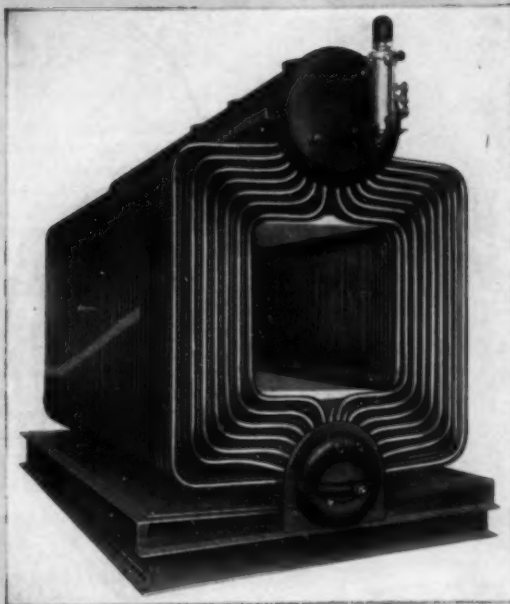
JAMES G. BIDDLE CO., 1316 ARCH ST.
PHILADELPHIA 7, PA.

ELECTRICAL TESTING • SPEED MEASURING INSTRUMENTS • LABORATORY & SCIENTIFIC EQUIPMENT



Offers

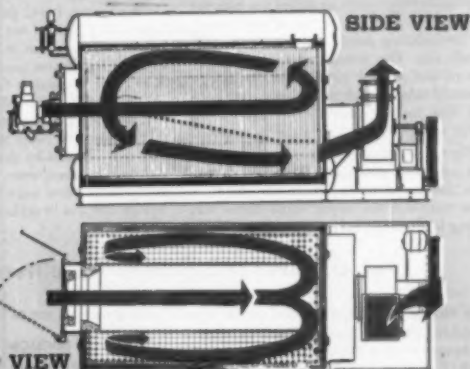
2-DRUM WATER TUBE DESIGN IN A COMPACT STEAM GENERATOR



Here's big boiler performance in small cubage. Keystone combines in a factory assembled unit: low head 2-drum water tube boiler complete with boiler trim, a heavily insulated steel casing—automatic burner for gas, oil or both interchangeably—induced draft equipment and instrument panel with all controls mounted. Complete range of sizes from 75 to 800 hp. at pressures from 160 p.s.i. Write for Bulletin SB-38.

Note THE UNIQUE 3-PASS GAS TRAVEL

Hot gases contact solid side banks of water tubes in first pass to the rear of the Keystone, divide to left and right and are deflected upwards and over inclined baffles in both side water tube elements, again contacting bare metal heating surfaces—make return or third pass under these baffles, contacting bare metal again in the return trip to the rear and out of the boiler. Quiet induced draft fan provides all the draft required for top ratings. Spent gases need only be vented. No stack is required.



ERIE CITY IRON WORKS 1504 East Ave. **ERIE, PA.**

"This Lubricant

kept 'em rolling in mud, muck and water"

—J. O. Archibald
at Redwood City, California



You may never have an earth moving job like this to do, but if you turn a wheel in any industry you can profit from Mr. Archibald's experience.

"The Leslie Salt Company called for bids for the conversion of 500 acres of salt marsh into crystallizing ponds for the production of bulk salt. The going was so tough that none of the several contractors invited to bid would take the job on a fixed price contract. Due to our success on similar work, the job was given to us on a cost plus basis.

"We moved in eighteen tractors as power units and the necessary Carryalls, Sheep Foots, Jeeps and other equipment. As soon as we removed the upper crust there was nothing but peat and marsh to run on. Trac-

tors would sink in over the track rolls. To keep equipment rolling would require a special lubricant.

"Knowing from past experience that LUBRIPLATE No. 107 not only reduced friction to a minimum, but it also prevented rust even in salt water and would seal out the muck, we adopted it for track and general lubrication. We selected LUBRIPLATE APG-140 for all transmissions and final drives. The effectiveness of these two LUBRIPLATE Products is evidenced by the fact that during the entire job there were no replacements of track rollers nor were there any tie-ups of equipment due to replacement or breakage."

J. O. Archibald

Yes, LUBRIPLATE Lubricants are different!

They reduce friction, wear and power consumption, prevent rust and corrosion and last longer than ordinary lubricants. LUBRIPLATE Lubricants are available from the lightest fluids to the heaviest density greases. There is a LUBRIPLATE Product best for your every lubrication need. Write for informa-

tion about the use of them in your industry.

LUBRIPLATE DIVISION—Fiske Brothers Refining Company, Newark 5, N. J., Toledo 5, Ohio.

DEALERS EVERYWHERE—SEE YOUR CLASSIFIED TELEPHONE BOOK

LUBRIPLATE

THE MODERN LUBRICANT

For more data circle item code number on the postage free post card—p. 17

Portable Air Compressor

E-19 INGERSOLL-RAND COMPANY, Phillipsburg, N. J., has announced a new type of large size portable air compressor. The unit delivers 600 actual cfm free air



at 100 psi. Total weight is 9500 lb ready for use. Major advantages claimed by the manufacturer are simplicity and low cost of operation and maintenance, reliability, light weight, and a discharge temperature lower than usual in portable compressors.

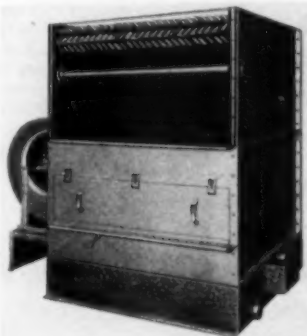
The compressor is two-stage, oil-cooled, rotating vane. Air is discharged at less than 200 F under normal operating conditions. It is driven by a General Motors diesel engine—6-cylinder, two-cycle, with 12-volt battery starting. Further information is available from the manufacturer.

Cooling Tower

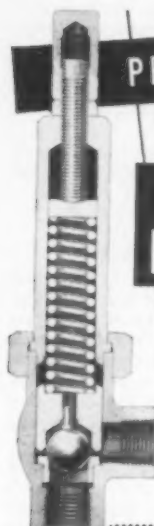
E-20 THE BINKS MANUFACTURING COMPANY, 3122 Carroll Ave., Chicago 12, Ill., has announced the development of a new and improved dry-fan cooling tower. These towers are of the blower type and are manufactured in two models.

The 2-B series is a single fan model available in 9 sizes, with capacities ranging from 3 to 30 tons of refrigeration. The smallest tower in this series is 2' x 2' x 6'; the largest is 6' x 6' x 7'6".

Air enters these cooling towers



Specify these Edward Steel Valves... from the Line that Gives You the Better Designs



PROTECT EQUIPMENT

against abnormal pressure increases with

Edward RELIEF VALVES

Edward relief valves protect equipment against sudden and unusual pressure increases in piping systems. Foolproof design and accurate spring action make them absolutely dependable. One low cost valve can save much expensive equipment.

Used extensively in power, chemical, process, petroleum, hydraulic, marine, and general industrial service, they are particularly suited for relieving pressure in pump lines, drums, heat exchangers, and unfired pressure vessels handling water, steam, oil, or vapor.

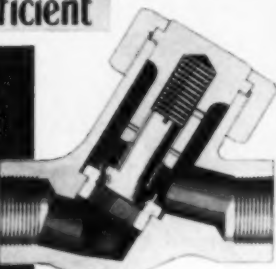
They need no packing, maintenance is negligible, and the fine pitch threads of the adjusting screw allow close regulation of pressure setting.

NEW BULLETIN

Write for new free bulletin No. 711 containing latest design details, dimensions, weights, and installation information.

Quiet... Efficient

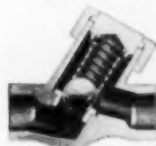
Edward NON-SHOCK Ball & Piston CHECK VALVES



Vibration, clatter, and damaging shock to piping are cut to a minimum with Edward forged steel ball and piston check valves. Cushioned closing action eliminates excessive vibration. Accurate guiding and spring loaded construction assure fast positive seating.

EValloy stainless steel seat and ball or piston give maximum trouble-free service.

Union or bolted bonnet in sizes 1/4 in. to 2 in. inclusive in two pressure classes—600 lb at 850 F and 1500 lb at 850 F. For complete information, write for Catalog 104.



EDWARD BUILDS Globe and Angle Stop Valves • Integral Bonnet Univalves • Gate Valves • Non-Return Valves • Blow-Off Valves • Feed Line Stop-Check Valves • Inlet (Integral Seat) Valves • Instrument Valves • Check Valves • Relief Valves • Hydraulic Valves • Gage Valves • Strainers • Special Designs

Edward PRESENTS

New ALL-PURPOSE STEEL VALVES



A new all-purpose valve series, ideal for almost any service where small O. S. & Y. steel valves are used.

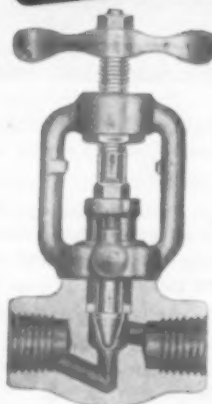
Drop forged steel for greatest strength... simplest packing arrangement... light, easily accessible union or bolted bonnet joints... bronze yoke bushings... microscopically mated seats and disks... lock welded parts. Built in sizes 1/4 to 2 in. inclusive, globe or angle, screwed or socket welding ends, carbon or chromium molybdenum steels, in 600 or 1500 lb pressure classes. Stocks now available.

Bolted bonnet 1-1/4 in. up 600 lb, 1 in. up 1500 lb. Union bonnet in smaller sizes.

For full details, dimensions, illustrations write today for your free copy of... **BULLETIN 501**

PRECISION REGULATION

Edward Instrument Valves



New Edward Fig. 952 series instrument valves, so compact they fit limited spaces in such hook-ups as panel boards and manifolds, give precision regulation for meter, gage, regulator, by-pass and instrument lines of all types.

Forged steel, globe or angle. Rated 6000 lb WOG, 1500 lb 850 F in carbon steel. Also in stainless steels with higher ratings.

- No bonnet joint to leak.
- Swing bolted gland for easy packing.
- Needle point stem, fine pitch threads for accurate regulation.

WRITE FOR NEW BULLETIN

Bulletin 491, with full details, is yours for the asking.

Edward Valves, Inc.

SUBSIDIARY OF ROCKWELL MANUFACTURING CO.

EAST CHICAGO, INDIANA



DART
is the Best Buyword
when you want
true economy



This True Ball Joint Makes the Difference

Buy a Dart and you buy a union you can use *over and over* again. You get *more* years of service — more drip-proof installations — *more* for your money.

Why do Darts last longer? Primarily because they're built heavier — *better*. Seats, for instance, are spherically ground to a *true* ball joint. Thus, a Dart tightens easily — stays tight. Seats remain unmarred — true and clean for the next installation.

What's more, practically indestructible, air-refined malleable iron is used for body and nut — bronze for both seats. There's maximum protection on the outside against rough usage — maximum protection inside against corrosion and pitting.

No question about it, Dart is a *better* buy.



DART UNION COMPANY
Providence 3, Rhode Island
The Fairbanks Co. — Distributors
Boston New York Pittsburgh

DART
UNIONS

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on the postage free post card—p. 17

through a squirrel cage type fan at the bottom of the tower and is exhausted at the top. For indoor installation special adaptor hoods are available for the top of the tower.

The 2-BB series are equipped with two double-inlet squirrel cage blowers. These towers are made in 4 sizes with capacities ranging from 32 to 60 tons of refrigeration. They range in size from 4'6" x 9' x 7'6" to 6'6" x 11' x 7'6".

Further information is available in the manufacturer's bulletins 46 and 47.

Materials Handling Equipment

E-21 THE AUTOMATIC TRANSPORTATION COMPANY, 149 West 87th St., Chicago, Ill., has developed a device that can add more than five feet to a fork truck's maximum lift. The new attachment is designed for use on standard fork trucks of any capacity the company makes.

The attachment can be built in a number of sizes, with the extra lift varying up to 62 inches. Overall height of the truck, which is 83 inches, is not increased by the device. The auxiliary unit has its own high pressure hydraulic rams, pump, and motor, and is operated by a push button control.

Full use of much storage space now wasted in factories and warehouses is permitted by the new device.





The extra ingredient in DIXISTEEL

It is true that all steel is made from the same basic materials and produced to established specifications.

But into every ton of DIXISTEEL is added an extra ingredient.

It is pride.

Pride on the part of more than 2,000 members of the DIXISTEEL family—men and women whose loyalty, skill and devotion have played a vital role in the growth, development and progress of Atlantic Steel Company and the South during the past half century.

On this, our Golden Anniversary year, we salute them—from the newest to J. T. Watkins, a veteran of 47 years. For they have made possible the steel and steel products you buy with confidence—DIXISTEEL.



ATLANTIC STEEL COMPANY • ATLANTA, GEORGIA

PRODUCERS OF FINE-QUALITY LOW-CARBON STEEL PRODUCTS, INCLUDING: HOT ROLLED BARS, SHAPES AND STRIP—DRAWN WIRE—NAILS, RIVETS, STAPLES—FENCE AND BARBED WIRE—FORGINGS AND STAMPINGS.

LAGONDA

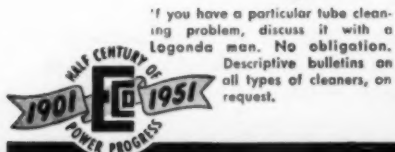
THE OLDEST NAME IN TUBE CLEANING



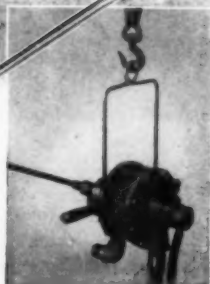
■ If years mean anything, they mean experience — in the case of Lagonda, they mean the solving of probably every tube cleaning difficulty no matter how unusual, that has ever confronted industry. . . . They mean the careful filing for immediate reference, of essential data compiled in solving those problems — invaluable data which is yours to command.

As the oldest name in tube cleaning, Lagonda means equipment which has been of established quality for so many years, that you can buy it with confidence.

"Any tube cleaning job is a Lagonda job."



If you have a particular tube cleaning problem, discuss it with a Lagonda man. No obligation. Descriptive bulletins on all types of cleaners, on request.



7-303

ELLIOTT Company

LAGONDA DIVISION • SPRINGFIELD, OHIO

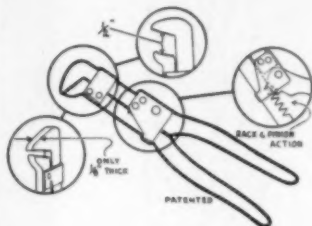
Plants at Jeannette, Pa. • Ridgway, Pa. • Ampere, N. J.
Springfield, O. • Newark, N. J.

DISTRICT OFFICES IN PRINCIPAL CITIES

For more data circle item code number on the postage free post card—p. 17

New Wrench

E-22 COLMAN TOOL & MACHINE Co., P. O. Box 364, Amarillo, Texas, is producing a new tool known as the "Power-Grip" wrench. Incorporating a rack-and-



pinion action with an angle head, the wrench affords extreme pressure application in ordinarily inaccessible spots. Head thickness is only $\frac{1}{8}$ ", while overall length is $5\frac{1}{4}$ ". Jaw opening gives an infinite number of sizes from 0 to slightly over $\frac{1}{2}$ ".

The wrench is useful for machinists and mechanics, tool-and-die makers, maintenance men, and in assembly and production operations.

Insulated Belting

E-23 IMPERIAL BELTING Co., 1750 S. Kilbourn Ave., Chicago 23, Ill., has developed a new type belting, called Super-Insulated Sahara, for conveying and elevating hot materials up to 600 F. This heat-resistant belt is made of heavy silver duck combined with asbestos and special insulating materials. It has been successfully used in handling various hot materials, including red hot castings and foundry shake-out sand.





OPERATION: FLEXIBILITY

A CLEAVER-BROOKS STEAM BOILER GIVES YOU:

- ✓ Quick, effortless response to fluctuating steam demands.
- ✓ Equally high efficiency (80%) operating with oil or gas.

Fluctuating steam loads are no problem when you have a custom-planned Cleaver-Brooks boiler in your plant. Whether your demand is heavy or light, steady or variable, these sturdy heavy-duty boilers respond instantly to your steam needs. Even with loads as low as 30% of rating, Cleaver-Brooks boilers operate with a flat 80% efficiency.

Cleaver-Brooks boilers burn either

oil or gas . . . either fuel is properly proportioned to meet your steam demand and need. No banking of fires or loss of valuable heat during low load periods. You benefit with lower fuel bills, less maintenance, reduced operating costs.

If you are considering a change in your present boiler plant—think about flexibility — and get the complete facts about Cleaver-Brooks custom-

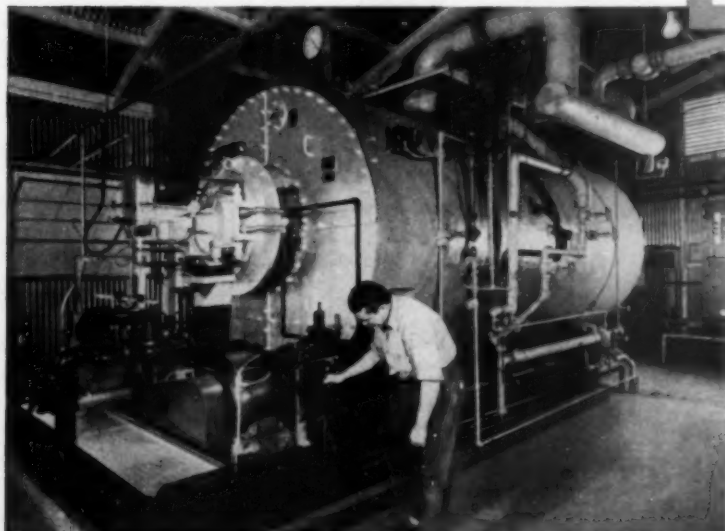
planned boilers. Cleaver-Brooks self-contained boilers 15 to 500 HP, 15 to 250 lbs., p. s. i. — oil, gas, combination oil and gas firing. CLEAVER-BROOKS COMPANY, 365 East Keefe Avenue, Milwaukee 12, Wisconsin.

Cleaver-Brooks

STEAM BOILERS
the first and finest of their class



Write for a
Cleaver-Brooks
Steam Boiler
Catalog.



THEY

*seal better...
last longer...*

BELMONT SHEET PACKINGS

Wherever flange and parallel surface joints must be connected for long trouble-free service — always select Belmont, the Better Sealing. . . longer lasting Sheet Packings. Long experience has made sheet packing manufacture a SPECIALTY with Belmont, that's why Belmont Sheet Packings are selected for every temperature . . . every pressure . . . every conceivable type of service. You can get standard Belmont Sheet Packings — made of compressed asbestos, asbestos metallic, red rubber, cloth inserted, vegetable fibre and a wide range of other constructions. However, whether you require standard or special sheet packing, remember — you always get better sealing . . . longer life with Belmont.

**THE BELMONT PACKING
AND RUBBER CO.**
Butler and Sepviva Streets
Philadelphia 37, Pa.



There's a Belmont Packing
for every service

Rings - Spirals - Coils - Reels - Steam - Water - Oil - Gas - Air
Spools - Sheets - Gaskets - Acids - Alkalies - Ammonia

CUT YOUR OWN GASKETS

WITH A
BELMONT

GASKET
CUTTER

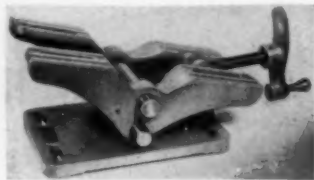


A portable tool for cutting 1 1/2" dia. to 19" dia. circular gaskets from all kinds of soft sheet packings. Rigid and simple to operate. Larger sizes only require cutter bar replacement.

For more data circle item code number
on the postage free post card—p. 17

Tilting Motor Base

E-24 THE LOVEJOY FLEXIBLE
COUPLING Co., 5144 West
Lake St., Chicago 44, Ill.,
is now producing a new, light weight,
adjustable, tilting motor base for use



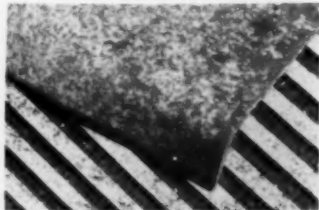
with fractional motors up to one horsepower. It is adjustable in width and length to accommodate all sizes and types of fractional horsepower motors.

The equipment is designed for use with variable speed pulleys, and also acts as a belt tightener and can be used for easy belt changing on Cone Step Pulleys. Speed changes can be made while the machine is in operation. Exact speed control is obtained by turning a handle screw adjustment.

The new tilting base is 5 1/2" x 7" in size and the shipping weight is 10 lb.

Stair Treads

E-25 AMERICAN MAT CORPORATION, 1790 Adams St., Toledo 2, Ohio, has developed two new types of heavy duty stair treads for industrial buildings. Produced from especially tough cord and rubber compounds, these treads cushion the steps and are said to provide an excellent non-slip surface. They are available in black, red,



green, blue, and mosaic. One type is of heavy molded rib construction and the other is of smooth surface.

Both types are easily installed by means of adhesive or tacking and may be curved over large nosings. They can be joined to cover any given area.

IN FLOW CONTROL EQUIPMENT,

*the BEST is not
too good for you.*

Why not take advantage
of Powell "know-how"
in design, workmanship,
and use of materials?

The Complete Line includes valves
in Bronze, Iron, Steel and the
widest selection of Corrosion-
Resisting metals and alloys ever
made available to Industry.

*Quality fine
throughout
"The Line"*

Fig. 3003 W. E.—Class 300-pound Cast Steel
O. S. & Y. Gate Valve with welding ends for
Power Plant installations.



POWELL

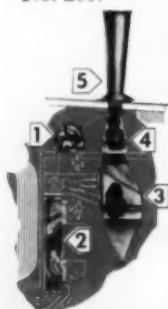
The WM. POWELL CO., 2525 Spring Grove Ave., P. O. Box 106, Station B, Cincinnati 22, Ohio.



You eliminate fluctuations or losses in draft efficiency by the use of Prat-Daniel Stacks. P-D Fan Stacks coordinate the relationship of fans, breeching and stacks to provide and maintain maximum efficiency.

Thousands of P-D Fan Stacks in long operation have proved their superior reliability over induced-draft fans and stacks purchased separately. Easily applied to any installation, they provide highly efficient draft for the load conditions of your power plant.

Our project engineers provide expert assistance on any problems of draft production and control. Call them on current problems or planned installations. Write for Catalog No. 200.



UNIT RESPONSIBILITY

Prat-Daniel, through its sales and project engineers, The Thermix Corp., offer a complete complement for handling the air gas stream shown at left; 1. Forced Draft Fans, 2. Air Pre-heaters, 3. Tubular Dust Collectors, 4. Induced Draft Fans and 5. Fan Stacks. This unit responsibility, by a well-known firm, relieves the engineer of the responsibility for one of the most important functions in a steam generating plant.

Sales and Project Engineers

THE THERMIX CORPORATION GREENWICH, CONN.

Canadian Affiliates: T. C. CHOWN, LTD.
1440 St. Catherine St., W., Montreal 25, Quebec
50 Abell St., Toronto 3, Ontario

Designers and Manufacturers

PRAT-DANIEL CORPORATION
SOUTH NORWALK, CONN.

News

William A. Roberts—Allis-Chalmers President

WILLIAM A. ROBERTS, executive vice president in charge of the tractor division for ALLIS-CHALMERS MANUFACTURING COMPANY since 1947, has been elected president of Allis-Chalmers.



W. A. Roberts

Roberts succeeds the late WALTER GEIST, who served as president from May, 1942, until his death on January 29.

The board also elected four new vice presidents and made other organization changes.



W. C. Johnson

W. C. JOHNSON, formerly executive vice president in charge of the general machinery division, was named executive vice president for the entire company.

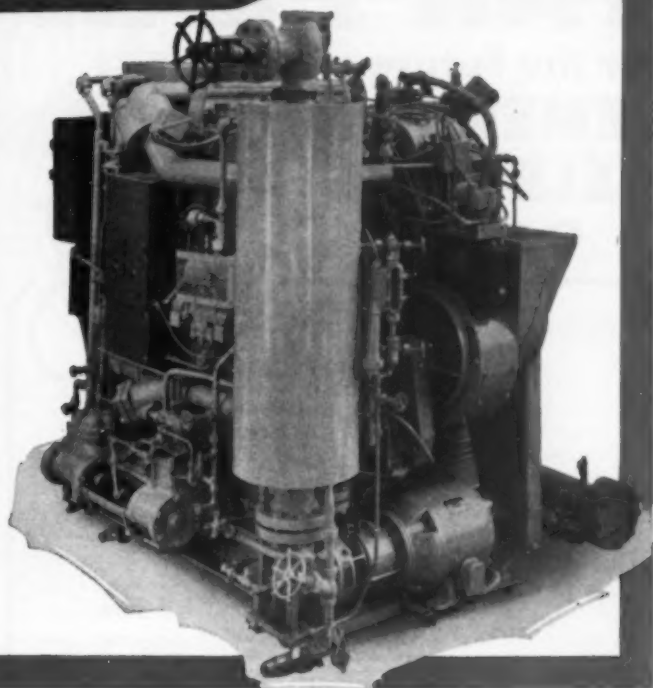
J. L. SINGLETON, formerly vice president and director of sales, general machinery division, was named vice president in charge of the general machinery division.

FRED MACKEY, formerly general works manager, general machinery division, was named vice president in

Not a Package Boiler—but a PACKAGED STEAM PLANT

*Compact
-Reliable
-fully
Automatic*

RE-CIRCULATION STEAM GENERATOR
Unit shown at the right is the
A-3000 lb of steam per hr. steam
generator a space 5'-11" long
x 5'-6" wide x 6'-11" high.
Other standard sizes—2000
and 4000 lb of steam per hr.



Do you need steam . . .

...for heating, processing or both—in unit capacities up to 6,000 pounds per hour—for pressure up to 300 psi?

...in remote locations involving the expense of installing and maintaining long insulated pipe lines?

...for intermittent requirements—a few hours each day or week?

...for an occasional load which may exceed the capacity of existing boilers?

...for a highly fluctuating load which involves sudden heavy demands?

...with completely automatic operation; with a minimum of attention necessary?

...at maximum output from minimum space?

If you do—if you have any one or a combination of these requirements—your best bet is the C-E Re-circulation Steam Generator... more than a package boiler... a complete steam plant, including all controls and auxiliaries in a fully integrated unit. Send for bulletin p-323.

E-450



COMBUSTION ENGINEERING—SUPERHEATER, INC.

200 Madison Avenue, New York 16, N. Y.

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

SOUTHERN POWER & INDUSTRY for APRIL, 1951

Take a Backward Look...



then

FAN-PLAN

for the Future with
**EMERSON
ELECTRIC**
Oscillators

Stationary hollow-steel shaft is case-hardened and rigidly anchored in the motor frame.

Forced-feed lubrication — oil is continuously fed to bearing surfaces by spiral grooves and conveyor return.

Fingertip oscillation control — lets you simply "dial" any sweep, from 90 degrees to stationary.

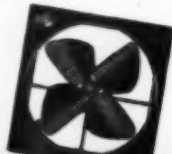
Remember a few years back when you were unable to purchase quality-built equipment? A backward glance today can help you plan for tomorrow... for example, in planning efficient, economical and long-lasting ventilation for your building, the known performance of

Emerson-Electric Oscillators is important. Their record of years of trouble-free service is your assurance of dependable ventilation no matter what the future brings. Fan-plan with the future in mind... see your electrical contractor, or write for free Catalog No. 222A.

THE EMERSON ELECTRIC MFG. CO. • St. Louis 21, Mo.

EVERYTHING IN FANS!

Besides the most complete line of Oscillating Desk and Stand Fans, Emerson-Electric offers Direct- and Belt-drive Exhaust Fans, Air Circulators, Ceiling Fans, Window Fans, and Low Table Fans. Write for Catalog No. 222B.



EMERSON
FANS • MOTORS



ELECTRIC
APPLIANCES

charge of manufacturing, general machinery division.

R. S. STEVENSON, formerly general sales manager, tractor division, was named vice president in charge of the tractor division.

A. W. VAN HERCKE, formerly director of engineering, tractor division, was named vice president in charge of engineering tractor division.

JOHN ERNST, formerly general works manager, tractor division, was named vice president in charge of manufacturing, tractor division.

Westinghouse Lamp Plant—Alabama

WESTINGHOUSE ELECTRIC CORP. has bought a 70-acre tract in western ALABAMA for construction of a new plant to manufacture light bulbs. OTIS O. RAE, manager of the company's Southeastern District, announced recently.

The site is one mile south of REFORM, a Pickens County community 34 miles northwest of TUSCALOOSA, ALA., and 29 miles east of COLUMBUS, MISS. The town is served by two railroads—the Gulf, Mobile and Ohio, and the Alabama, Tennessee and Northern.

The new lamp plant will be the first in Alabama producing Westinghouse consumer products. Construction of a new Westinghouse plant in Birmingham for the manufacture and repair of large electrical equipment has been authorized. There are company sales offices in MOBILE and BIRMINGHAM. H. E. ROBINSON, Alabama manager for the Westinghouse Lamp Division, has his headquarters in Birmingham.

FUTURE EVENTS

Of Engineering Interest

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, C. E. Davies, Sec'y, 29 West 39th St., New York, N. Y.
April 2-5, Spring Meeting, Hotel Atlanta-Biltmore, Atlanta, Ga.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, H. H. Henline, Sec'y, 33 West 39th St., New York 18, N. Y.
April 11-13, Southern District Meeting, Miami Beach, Fla.

AMERICAN SOCIETY OF LUBRICATING ENGINEERS, W. F. Leonard, Sec'y, 343 S. Dearborn St., Chicago, Ill.
April 16-18, Annual Meeting, Bellevue-Stratford Hotel, Philadelphia, Pa.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, C. E. Davies, Sec'y, 29 West 39th St., New York, N. Y.
April 17-19, Process Industries Conference, Baltimore, Md.

NATIONAL MATERIALS HANDLING EXPOSITION, Clapp & Pollak, Inc., 341 Madison Ave., New York 17, N. Y.
April 20-May 4, Fourth Annual Exposition, International Amphitheatre, Chicago, Ill.

NATIONAL ASSOCIATION OF POWER ENGINEERS, INC., A. F. Thompson, Director of Exhibits, Suite 1659, 176 West Adams St., Chicago 2, Ill.
Aug. 21-23, Golden Anniversary National Power Show, Hotel Plaza, San Antonio, Texas.

Atlas PERMANENT ACID, ALKALI, SOLVENT, GREASE PROOF INDUSTRIAL FLOORS

Recognized as standard construction for 20 years by leading architects and engineers for floors in chemical, steel, electroplating, textile, paper and food plants. Write for Bulletin 3-1.

ALKOR 5E

ALKOR 5E, the pioneer acid, alkali, solvent and grease-proof resin cement. Low water absorption, high strength and high adhesion to brick.

VITROBOND®

The pioneer plasticized hot-poured sulfur cement is inert to most acids and corrosive solutions. For specific properties send for Bulletin 5-1.

Atlas also manufactures a complete line of coatings, linings, adhesives and jointing materials.



Over a
half century
of service.



Atlas
MINERAL PRODUCTS COMPANY
MERTZTOWN, PA. HOUSTON, TEXAS

ONE BASIC PUMP SERVES TWO DIFFERENT NEEDS

This heavy duty, single-stage, single-suction pump handles pulp stock and acid or liquor . . . easily converts to meet production changes or replacement needs.

QUICK CONVERSION FROM ONE JOB TO ANOTHER!

Converts from pulp stock handling to acid-liquor service by merely changing a few pump parts. For hot service, a water-jacketed stuffing box is easily added.

SMALL NUMBER OF SPARE PARTS SERVES MANY PUMPS

By standardizing on these pumps, you also economize on spare parts—a small number of interchangeable parts protects a large number of pumps.

EASILY REPAIRED WITHOUT DISTURBING PIPING

Dismantling is simple. Entire bracket, rotating element and pump cover can be unbolted and lifted free from the case without disturbing suction and discharge piping.



Capacities: 400 to 4,000 gpm

Heads: 40 to 200 ft.

Pump Sizes: 3, 4, 5, 6, 8, 10 and 12 inch

STANDARDIZE ON THE

BJ PULP PUMP

for pulp stock and acid or liquor handling

Byron Jackson Co.

Since 1872

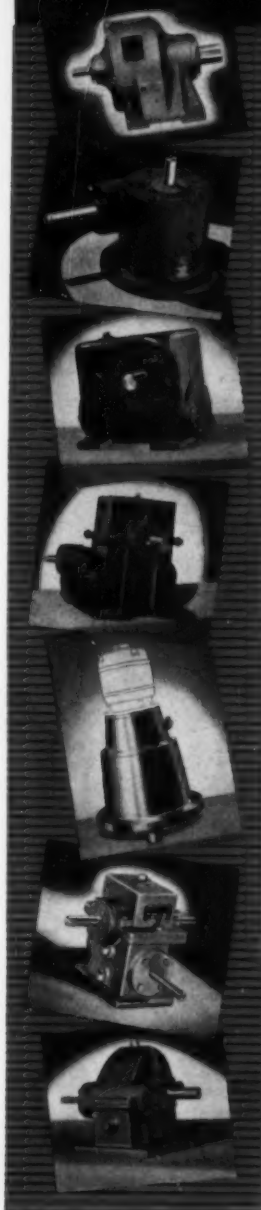
P.O. Box 2017 Terminal Annex, Los Angeles 54, Calif.
OFFICES IN PRINCIPAL CITIES

For full details, write for Bulletin No. 48-0000

Shorten the interval between
design and assembly line with

WINSMITH

Standardization



Huge military and domestic needs place increased emphasis on design speed-ups and production simplification.

This calls for maximum standardization. One way to achieve it, where power transmission problems are involved, is with Winsmith speed reducers. For, no matter how individual the purpose, how specialized the function, how complex the design and production problems, most requirements can be served with standardized Winsmith reducers.

With industry's widest range of standard designs and sizes from fractional to 85 H.P., Winsmith can meet your normal and special demands . . . can help you shorten the interval between machine design and assembly line.

And a Winsmith power transmission engineer in your locality is available for consultation.

DESCRIPTIVE FOLDER, "Save through Standardization," will aid in your selection. Write.

**WINFIELD H. SMITH
CORPORATION**

555 SPRING ST.
SPRINGVILLE (Erie County), N. Y.



WINSMITH
SPEED REDUCERS

Westinghouse Contract— New Orleans

A contract for \$129,593 has been awarded to the Elevator Division of the WESTINGHOUSE ELECTRIC CORPORATION. It covers the installation of elevators in the new Pan-American Life Insurance Company office building now being erected in New Orleans, LOUISIANA.

The six-story structure was designed by Skidmore, Owings and Merrill of New York; one construction feature will be the use of aluminum fins extending from the ground to the roof of the building. In keeping with the design, Westinghouse will install modernistic, stainless-steel elevator cars with power-operated stainless-steel doors. Each of the four elevators will have a capacity of 3,000 pounds and a speed of 300 feet per minute.

JENS BRAAE-JENSEN of New Orleans is consulting engineer for the structure, which is being erected by the GEORGE J. GLOVER CONSTRUCTION COMPANY, also of New Orleans.

Allis-Chalmers—Southern Representatives

Three sales representatives, all mechanical engineers, have been newly named to ALLIS-CHALMERS general machinery division offices in the South. They are JOHN P. McLANEY and WEBSTER C. ENGLISH, assigned to the CHARLOTTE district office, and ANDREW J. BEALL, JR., named to the NEW ORLEANS office.

Rust Branch Office—Washington

PEYTON S. HOPKINS has been named to manage the WASHINGTON, D. C., office of THE RUST ENGINEERING COMPANY. He will succeed RICHARD E. BUTLER who is retiring after 20 years of service with the Company.

Mr. Hopkins was previously associated with the Rust firm on projects in MOBILE and GADSDEN, ALA.

Institute, W. Va., Plant Personnel

Appointments at the government synthetic rubber plant at INSTITUTE, W. VA., recently announced by B. F. GOODRICH CHEMICAL COMPANY, the plant operators, include:

TOM B. NANTZ, LOUISVILLE, KY., is plant manager; WALTER E. BRODINE, former engineer at the PORT NECHES, TEXAS, GR-S plant, operated by Goodrich for the government, is plant engineer; SIGMUND S. MICHELS, also from Port Neches, is technical manager at the Institute plant; ANTON VITTONI, Louisville, is production manager;

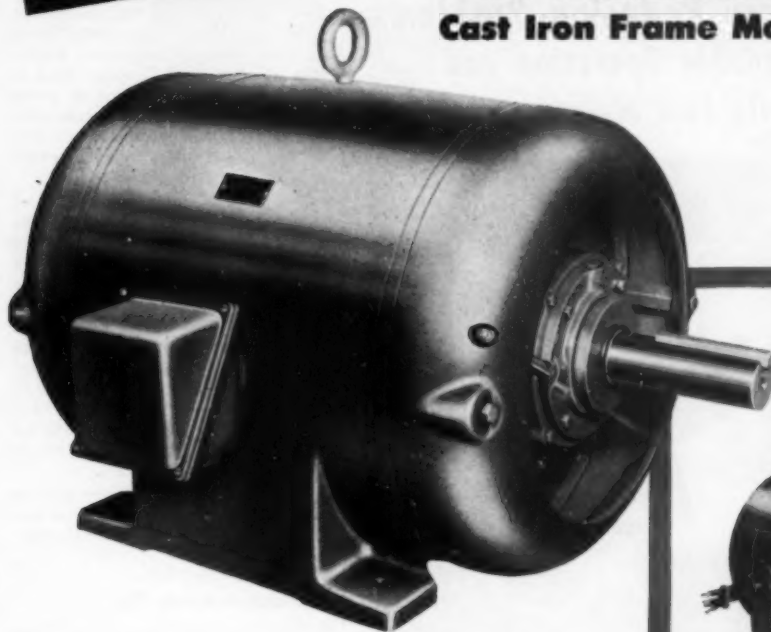
Wagner
ELECTRIC MOTORS
...the choice of leaders
in industry

corrosion is no problem—

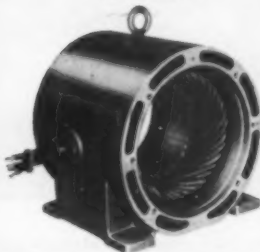
WHEN YOU USE

Wagner

Cast Iron Frame Motors



Rugged, one piece,
corrosion-resistant,
cast iron inner and
outer frame, showing
openings for
ventilation.



**They resist the damaging action of acids, fumes,
moisture and other destructive elements**

Wherever corrosion resistance is a "must" for motors—in chemical plants, oil fields, refineries, and industrial plants where tough operating conditions exist—Wagner Cast Iron Frame Motors are a sound choice.

They feature special varnish treated windings that resist acids and alkalis... a cast iron, gasket-sealed conduit box... and drain plugs in the endplates for easy removal of condensation from inside the motor. They are totally enclosed

in rust and corrosion-resistant cast iron—even the nameplate is made of corrosion resistant material!

Wagner Cast Iron Frame Motors are available in ratings from 5 to 250 horsepower, in both standard totally-enclosed fan-cooled and explosion-proof designs.

Bulletins give full information on these, and other motors in Wagner's complete line. Thirty-one branch offices, located in principal cities, are ready to assist you in any motor application problem.

Wagner
Electric Corporation

1891 **W.E.** 1951

WAGNER ELECTRIC CORPORATION

6383 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

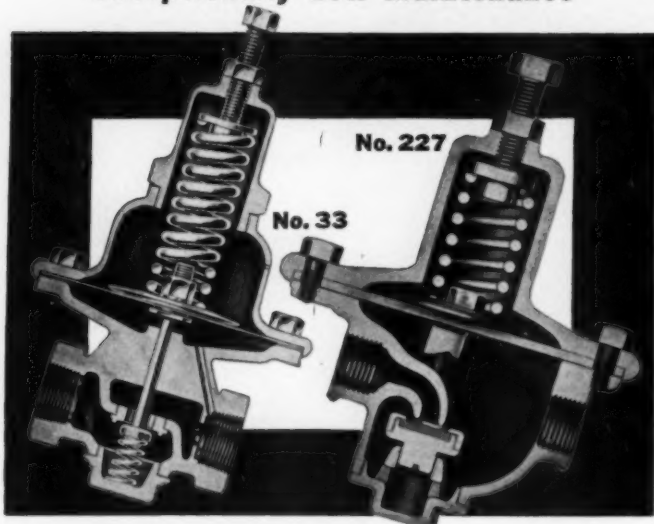
4402-51



MASONEILAN REGULATORS

Solve

**Pressure Reducing Problems
with Dependable Operation and
Exceptionally Low Maintenance**



You can count on Mason-Neilan Reducing Valves . . . for steam, water and air service . . . to reduce waste, cut costs and save money. That is why production and maintenance men in hundreds of plants use and recommend them. Their experience proves Mason-Neilan Reducing Valves provide accurate control and require minimum maintenance.

No. 33 for steam and air service — sizes from $\frac{1}{8}$ " to $\frac{3}{4}$ ". Reduced pressure ranges 2 - 20; 20 - 40; 40 - 100 psi. Maximum working pressure 200 lbs.

No. 227 for water service — sizes $\frac{1}{4}$ " to 2". Reduced pressure ranges between 10 and 60 psi. Maximum working pressure 150 psi. Also available for air service from $\frac{1}{4}$ " to 1".



Mason-Neilan Strainers protect pressure regulators, shut-off valves and other apparatus from damage by keeping out dirt, chips and other foreign matter.

Your local Mason-Neilan industrial distributor is ready to serve you.

MASON-NEILAN REGULATOR CO.

1206 ADAMS STREET, BOSTON 24, MASS., U.S.A.

Sales Offices or Distributors in the Following Cities:

New York • Syracuse • Chicago
St. Louis • Philadelphia • Tulsa
Houston • Denver • Pittsburgh
Boise • Albuquerque



Cleveland • Cincinnati • Atlanta
Detroit • Los Angeles • El Paso
San Francisco • Salt Lake City
Charlotte, N. C.

Mason-Neilan Regulator Co., Ltd., Montreal and Toronto

GERALD A. BALZERSEN is manager of industrial relations; GEORGE R. ERS has been appointed plant auditor; and JOHN R. MIX has been appointed staff manager.

AEC—Amarillo

The U.S. Atomic Energy Commission is negotiating with the Department of the Army for production space in the PANTEX ORDNANCE PLANT, 17 miles east of AMARILLO, TEXAS. The segment of the ordnance plant to be used would likely include about 4,000 acres of the present reservation and some existing equipment and buildings. There also will be new construction within this area.

The Santa Fe Operations Office of the Commission has designated the Silas Mason Company, New York, as architect-engineer and the company has started preliminary engineering surveys at the site. Construction will begin in early 1951.

Early employment at the plant will be only of construction workers. Eventually about 1,000 persons will be employed to operate the facility, but recruitment of these workers will not begin until construction is nearly completed.

Upon completion the new facility will be operated by an industrial concern under a cost-plus-fixed-fee contract.

Automatic—Kansas City

Appointment of INTERSTATE INDUSTRIAL EQUIPMENT COMPANY, division of B. B. AND S. COMPANY, INC., KANSAS CITY, Mo., as sales representative for the AUTOMATIC TRANSPORTATION COMPANY, CHICAGO, manufacturer of electric industrial trucks, was announced recently.

Interstate, of which WILLIAM E. BRIECE, SR., is president, will cover the entire state of KANSAS and the western half of MISSOURI.

Northern Equipment Division—La., N. C.

NORTHERN EQUIPMENT DIVISION, CONTINENTAL FOUNDRY & MACHINE COMPANY, Erie, Pa., has announced appointment of the WARRINER EQUIPMENT COMPANY, 504 Delta Bldg., NEW ORLEANS, LOUISIANA, and HAWKINS-HAMILTON COMPANY, 814 Independence Bldg., P. O. Box 1575, CHARLOTTE, NORTH CAROLINA, as district representatives for the following products: Copes boiler feedwater regulators, differential valves, pump governors, pressure reducing valves, desuperheaters, liquid level controls, alarms and allied equipment.



***"Freedom of thought
and independence
of action..."***

DONALD W. DOUGLAS

President, Douglas Aircraft Company, Inc.

"Freedom of thought and independence of action are among the keynotes of America's economy. They are fundamental to our way of life. Systematic savings through the Payroll Savings Plan help the individual maintain his own independence and freedom of action and make us strong as a nation."

In more than 21,000 large companies (employing 100 or more) and in many smaller companies, more than 8,000,000 men and women are helping to keep America strong. By systematic saving in U. S. Savings Bonds they are doing their part to offset inflationary tendencies . . . they are building a reservoir of future purchasing power to support industry...they are providing financial independence for themselves and their families.

The widespread success of the Payroll Savings Plan is an excellent example of our freedom of thought and independence of action. Far-sighted employers offered these 8,000,000 Americans an opportunity to enroll in the Payroll Savings Plan. There was no pressure, no emotional stimulation. A Payroll Savings Plan application was placed before them. They "signed up"—to the benefit of them-

selves, their companies and their country.

Has every man and woman in your company been offered an opportunity to share in the benefits of the Payroll Savings Plan? How about the newer employees? How about those who did not sign before but may wish to do so now? Delegate one of your top executives to conduct a person-to-person canvass of your employees to make sure that every man and woman gets an application blank. You don't have to urge them to enroll, or to increase their present allotment—they are anxious to build for their own independence.

Get in touch with your State Director, U. S. Treasury Department, Savings Bonds Division. He is ready to help you—with a package plan that reduces your work to the minimum.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the G. M. Basford Company and

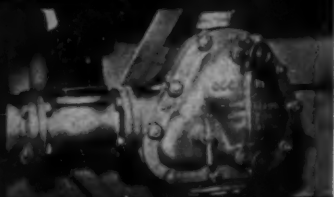
SOUTHERN POWER & INDUSTRY



COCHRANE MULTI-PORT DRAINER

(Continuous Flow Steam Trap)

CONTINUOUS DRAINAGE of low pressure condensate and HIGH DISCHARGE CAPACITY are features of the Cochrane Multi-Port Drainer that have made these continuous flow steam traps popular the world over.



Balanced Rotary Valve and large port areas permit instant response to great discharge demands. Valve opening is determined by height of water in float chamber. As volume of water increases, the larger the valve opening becomes.



Other features. Valve never leaves its seat and is self-cleaning. Inlet at top prevents possibility of trap becoming air bound. Rotary Valve Seat is attached directly to float stem, one moving element. Write for Publication 4340.



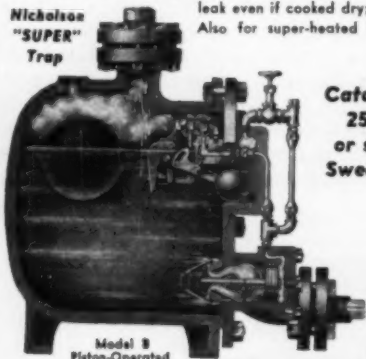
COCHRANE CORP., 17th ST. & ALLEGHENY AVE., PHILADELPHIA 32, PA.

Most Widely Used Way of Trapping

HEAVY SLUGS of CONDENSATE

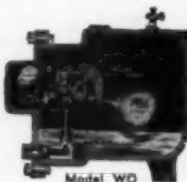
Thousands of installations on steam purifiers attest to the enormous drainage capacity of this Nicholson trap. Piston-operated and with valve orifices up to 2" diameter, it discharges large volumes of water almost instantly. Won't leak even if cooked dry; working parts of stainless steel. Also for super-heated lines, headers, separators, etc.

Nicholson
"SUPER"
Trap



Model B
Piston-Operated

Catalog
250
or see
Sweet's



Model WO

NICHOLSON WEIGHT-OPERATED TRAPS — Three models for pressures to 200, 650 and 1500 lbs.; for steam, air, gasoline. Also feature large capacity and proof against leaking.

W. H. NICHOLSON & CO., 175 Oregon St., Wilkes-Barre, Pa.

Bethlehem Represents Tube Turns

Announcement has been made of a merger of BETHLEHEM SUPPLY CO., TULSA, OKLA., and Bethlehem Supply Co. of California. The company has been appointed authorized distributor of TUBE-TURN welding fittings and flanges, according to an announcement by JOHN G. SEILER, Executive Vice President and General Sales Manager of TUBE-TURNS, INC., 224 East Broadway, Louisville 1, Kentucky.

Westinghouse Promotes Kersh

ROBIN S. KERSH, formerly manager of central station sales for the Westinghouse Electric Corporation, has been named manager of the Company's Steam Division at South Philadelphia, Pa.

From 1931 to 1938 Mr. Kersh served in sales work in the ATLANTA, GA., and BIRMINGHAM, ALA., offices of the Company, after which he returned to the East Pittsburgh plant as a member of the machinery electrification department.

In 1942 Mr. Kersh was named manager of the Company's HOUSTON, TEXAS, office and remained there until 1947, when he was appointed manager of industrial sales at East Pittsburgh.

Allis-Chalmers Expansion

THE INDUSTRIAL ELECTRIC COMPANY, 617 Gillespie Street, FAYETTEVILLE, NORTH CAROLINA, has been named a dealer for Allis-Chalmers motors, controls, pumps, transformers and Texrope drive equipment in 17 central and southeastern NORTH CAROLINA counties and in five north-eastern SOUTH CAROLINA counties. E. L. PLUNKETT is manager of the firm.

FRANK R. HUNTER has been named manager of a new branch office of ALLIS-CHALMERS' general machinery division in WICHITA, KANSAS.

G.E. Record For Large Turbine Generators

THE GENERAL ELECTRIC COMPANY in 1950 broke its all-time record for production of large turbine generators, according to GLENN B. WARREN, manager of the G-E Turbine Divisions.

The company's new \$30,000,000 turbine plant at Schenectady, N. Y., in its first full year of operation, produced units with a combined capacity of 2,866,000 kilowatts.

Almost the entire 1950 output of the new 20-acre Schenectady plant went to utilities throughout the U.S.

Mr. Warren attributed the unprecedented rise in orders for turbines to "the multi-billion-dollar expansion

program launched by the power companies immediately following World War II which has permitted these companies to keep ahead of demand, and to the tremendously increased demand for electric power by industry since the start of the Korean crisis."

Pennsalt Plant—Montgomery

THE PENNSYLVANIA SALT MANUFACTURING COMPANY's new plant for formulating insecticide concentrates and finished insecticide products at MONTGOMERY, ALABAMA, has been completed and is now in production.

The plant, Pennsalt's first in the Southeast, also includes a new district sales office of the Agricultural Chemicals Department to serve southeastern agriculture. J. DRAKE WATSON is district sales manager and R. O. WHITE is plant superintendent.

Production equipment is designed to manufacture either concentrates of insecticide formulations for other blenders or finished insecticide products ready for growers' use.

The plant building itself, with approximately 15,000 square feet of floor space, was constructed by MONTGOMERY INDUSTRIES, INC., a corporation of Montgomery businessmen organized by the Chamber of Commerce. Pennsalt occupies the building under a lease agreement with an option to purchase.

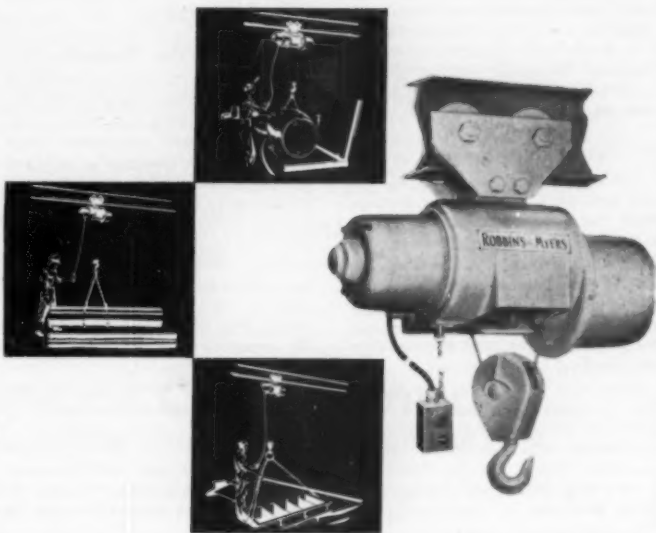
The plant is located on the Montgomery-Birmingham highway and is served by a siding of the Gulf, Mobile and Ohio Railroad. The building is constructed of concrete block, brick and steel. In addition to production, warehouse and shipping facilities, it also houses the sales office, a plant administration office, a quality control laboratory and service facilities for employees.

General contractor for construction and equipment installation was BEAR BROS., INC., of Montgomery. The building was designed by PEARSON, TITTLE AND NARROWS, architects, also of Montgomery. Process equipment was supplied by the YOUNG MACHINERY COMPANY of Muncie, Pa., for arrangement designs specified by Pennsalt's Engineering Department.

Aluminum Association Officers

At the annual meeting of THE ALUMINUM ASSOCIATION held in New York, A. P. COCHRAN of the COCHRAN FOIL COMPANY, INC., LOUISVILLE, KY., was elected president for the ensuing year. A. V. DAVIS, Aluminum Company of America, New York, was re-elected chairman of the board and DONALD M. WHITE was reappointed secretary and treasurer.

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WILL BE AT BOOTH 218 Materials Handling Exposition, Chicago International Amphitheatre April 30 through May 4. References and detailed information on abilities and qualifications gladly furnished. Write for Bulletin S41P, at the address below.

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Elected to serve as vice-presidents were: I. T. BENNETT, Revere Copper and Brass Inc., Baltimore, Md.; L. M. BRILE, Fairmont Aluminum Company, Fairmont, W. Va.; and E. G. FAHLMAN, The Permold Company, Medina, Ohio. Elected as directors-at-large for three-year terms were: G. A. GINSBURG, United Smelting and Aluminum Company, Inc., New Haven, Conn.; R. S. REYNOLDS, JR., Reynolds Metals Company, Richmond, Va.; and HARRY L. SMITH, JR., Aluminum Company of America, Pittsburgh, Pa.

St. Louis Industrial Growth

The month of January set an all-time new high in industrial development for Metropolitan St. Louis according to an announcement by GEORGE C. SMITH, President of the St. Louis Chamber of Commerce. Three new industries and the expansion of eighteen local companies call for an added investment of more than one hundred million dollars.

About one third of the new investment is represented by new plants for DOW CHEMICAL and LEVER BROTHERS COMPANIES. The Dow plant, when in operation, will make St. Louis the world's largest producer of magnesium metal products.

The new Lever Bros. plant, the first unit of which will be used for the manufacture of detergents, will be expanded later to provide for the manufacture of shortening, margarine, soaps and other products.

The new plant to be built by the PUREX CORPORATION will also manufacture detergents.

Westinghouse Vice Presidents

The Board of Directors of the WESTINGHOUSE ELECTRIC CORPORATION recently elected four new vice presidents. They are TOMLINSON FORT, manager of the company's headquarters apparatus sales department at Pittsburgh; L. W. MCLEOD, southwestern district manager, with headquarters at St. Louis; EMERY W. LOOMIS, middle Atlantic district manager, Philadelphia, and L. E. LYNDE, who has been New England district manager at Boston, but now will head the company's Washington, D. C., government office.

Mr. Fort, a native of ATLANTA, GA., has been with the company since 1923, holding sales positions in Albany, N. Y., New York City and Pittsburgh. He was named manager of central station sales in 1943, and manager of the apparatus sales de-

partment, the post he now holds, in 1949.

Mr. McLeod, who was born at MOUNT OLIVE, MISS., has been with Westinghouse since 1925. He has held sales positions in the company's offices in Houston and San Antonio, Tex., Wichita, Kans., and Memphis, Tenn., before being assigned to the St. Louis office in 1939 as central station division manager. He was appointed southwestern district manager in 1946.

AIEE Spring Meeting

The SOUTHERN DISTRICT meeting of the AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS is scheduled to be held April 11-13 at MIAMI BEACH, FLA. Included in the district are the states of KENTUCKY, VIRGINIA, TENNESSEE, NORTH AND SOUTH CAROLINA, LOUISIANA, MISSISSIPPI, ALABAMA, GEORGIA AND FLORIDA.

Reynolds Metals—Corpus Christi

RICHARD S. REYNOLDS, JR., President of REYNOLDS METALS COMPANY of RICHMOND, VIRGINIA, recently announced that his company will build an 80 million dollar aluminum reduction plant in the CORPUS CHRISTI, TEXAS, area which will have the capacity to produce 150,000,000 pounds of aluminum pig annually. It will be located in San Patricio County near Gregory.

It is expected that the plant will be in operation by the last of the year. About six hundred people will be employed.

The engineering firm of J. GORDON TURNBULL, INC., of Cleveland has been engaged to engineer and supervise erection of the facilities. It is planned to use all local services possible.

An electric power plant will be constructed in conjunction with the aluminum operation which will have the capacity to generate 175,000 kilowatts of power, all of which will be required in operation of the aluminum plant. The power will be generated by internal combustion engines which will be energized by natural gas.

The aluminum reduction facility will be housed in four pot line buildings each 1,600 feet long. In addition there will be several buildings including a carbon plant which will produce the carbon required for the operation. Soderberg type anodes are to be used.

Aluminum is made from alumina which is made from bauxite. One of the reasons for selection of the site chosen is because of good shipping facilities from Jamaica from which bauxite will eventually be moved to the contemplated alumina plant.

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THE Davis No. 60 Float Valve, illustrated here, is unexcelled for dependable performance. It handles either hot or cold water with no "hunting," no "water-hammering." Opens easily against any pressure up to 125 p.s.i. and closes positively drip tight. No sticking; there is no internal packing to swell and cause excessive friction. Built in sizes, 1/2" to 12". Angle or globe patterns. Standard construction — composition disc, bronze trim. All bronze or stainless trim available. Contact your distributor or write.



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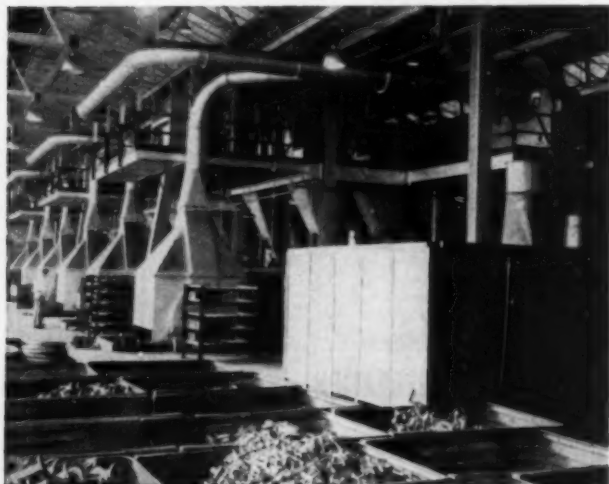
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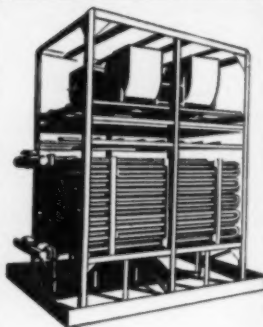
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B-10 ARC WELDERS—Bulletin, 2 pages—Illustrates and describes arc welders for sheet metal production and repair. Includes table of power requirements, dimensions, shipping weight, and photographs of models available. —LARKIN ELECTRO PRODUCTS CO., Pine Bluff, Ark.

B-11 INDUSTRIAL WATER CONDITIONING—Brochure, 12 pages—"Water Patrol for Profit Control" discusses control of scale, corrosion, and algae in relation to profits of industrial plants. Colored charts and illustrations accompany non-technical explanation. —AQUATROL, INC., P. O. Box 12233, Houston, Texas.

B-12 PLASTIC COATING—Bulletin, 12 pages—Vinyl plastic coatings to control corrosion and deterioration of steel, concrete, brick, formed block and plywood. Also for tank linings. Gives specific qualities and resistance chart. Coatings are non-contaminating, tough, and effective against caustic sterilizing and cleaning agents; unusually long lived. —CASEY & CASE COATING COMPANY, P. O. Box 151, Maywood, Calif.

B-13 LUBRICANT—Lubriplate Data Book No. 1-59, 54 pages—Discusses suitability as the governing factor in selection of lubricants. Gives product data, and a detailed list of lubricants suitable for use with equipment in specific industries. List of dealers is included. —FISKE BROTHERS REFINING CO., LUBRIPLATE DIVISION, 123 Lockwood St., Newark 5, N. J.

B-14 HEATING AND HEAT TREATING—Bulletin SC-150, 3 pages—Illustrates and describes heating and heat treating equipment for production. Covers heating for forging and heat treatments to develop the required properties for production of engines, power transmission equipment, tools, special parts, and ordnance material. —SURFACE COMBUSTION CORPORATION, Toledo 1, Ohio.

B-15 MACHINERY—Bulletin 187, 28 pages—Covers all types of machinery manufactured by the company; illustrated with installation and product photographs. Gives data on diesel engines, gasoline engines, mine hoists, air and gas compressors, maintenance equipment. —NORDBERG MANUFACTURING COMPANY, Nordberg 7, Wis.

B-16 INDUSTRIAL HOSE—Catalog, 14 pages—Contains engineering data, construction specifications and other information to aid engineers in selection and care of fire hose, dust conveying hose, creamery hose, lacquer spray and solvent hose, insecticide spray hose and other varieties in the company's line. —NEW YORK BELTING AND PACKING COMPANY, 1 Market St., Passaic, N. J.

B-17 INDUSTRIAL TRUCKS—Standard Specifications Folder, 4 pages—Data on fork lift trucks, tractors and electric pallet trucks, including capacities, load centers, lift heights, weights, dimensions, turning radii, speeds of travel. —TOWMOTOR CORPORATION, 1226 E. 152nd St., Cleveland 19, Ohio.

B-18 WATT-HOUR METERS—Bulletin GET-1840, 40 pages—Covers fundamentals of a-c metering, showing how electricity is measured; describes operation; explains techniques involved in use, testing and maintenance of meters. Illustrated with charts, diagrams and photographs. —GENERAL ELECTRIC COMPANY, Apparatus Dept., Schenectady 5, N. Y.

B-19 STEAM TRAPS—Catalog, 34 pages—Revised edition of "Solving Steam Trap Problems" contains practical information for engineers, contractors, and maintenance men who specify, install or service steam traps. Tells how to calculate condensation loads and select traps for all classes of equipment. —V. D. ANDERSON COMPANY, 1934 West 96th St., Cleveland 2, Ohio.

B-20 FEEDWATER CONTROL—Bulletin 185-C, 16 pages—Latest developments in the company's three-element feedwater control are described. Suggests solu-

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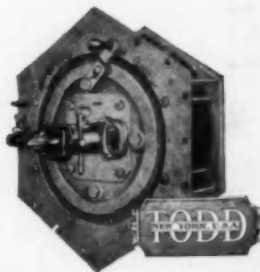
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tions for solving problems in feed-water control by means of the Bailey air-operated system. Contains diagrams, cutaway views, typical chart records, and photographs of installations. — **BAILEY METER COMPANY**, 1950 Ivanhoe Road, Cleveland 16, Ohio.

B-21 CONVEYOR CHAIN — Folder No. 2344, 4 pages — Flat-top conveyor chain for the transportation of small containers, bottles, packages or parts through such operations as washing, bottling, pecking, capping and labeling, is described; dimensions and pertinent data are given. — **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

B-22 POWER TOOLS — Condensed Catalog No. PT43-1-51, 4 pages — Complete specifications are given for the company's line of "Portable Tools for Industry," including heavy duty drills, standard duty drills, and the super-special 1/2-inch model. Saws, disc sanders, and other equipment are described and illustrated. — **CUMMINS PORTABLE TOOLS**, Division of Cummins-Chicago Corp., 4740 N. Ravenswood Ave., Chicago 40, Ill.

B-23 AIR COMPRESSOR DRIVES — Catalog No. 200-Syn-32, 24 pages — Information on motor drives for all types of large air compressors, including application and selection data on motors and controls for a variety of compressor types and sizes. Illustrated, and contains tables, charts, and graphs for matching motor characteristics to compressor requirements. — **ELECTRIC MACHINERY MFG. CO.**, Minneapolis 13, Minn.

B-24 INDUSTRIAL INSTRUMENTS — Describes and illustrates proportioning, blending and process control equipment, including control panels and automatic scales. Gives case histories of complete systems that have been installed, ranging from proportioning glass aggregate for furnaces to weighing meals for distilleries. — **RICHARDSON SCALE COMPANY**, Clifton, N. J.

B-25 RADIATORS — Catalog No. 1651, 4 pages — Covers line of one-piece "Mono-Weld" radiators available in various sizes capable of dissipating from 70,000 to 800,000 Btu per hour under standard conditions, with sectional-type core units of larger size ranging in capacity from 960,000 to 3,250,000 Btu per hour. — **YOUNG RADIATOR COMPANY**, Racine, Wis.

B-26 HYDRAULIC OIL — Bulletin, 8 pages — "Stop Downtime and Expensive Repairs on Hydraulic Presses, Machine Tools, Etc.," presents correct method and equipment to maintain hydraulic oil in the original condition for indefinite periods under severe operating conditions. Explains operation of the company's hydraulic oil purifiers. Illustrated with plant photographs and schematic drawings. — **HONAN-CRANE CORPORATION**, 56 Madison Ave., Lebanon, Ind.

B-27 INDUSTRIAL FLOORS — Catalog No. 1103, 15 pages — Discusses open steel flooring and safety treads. Contains specification data, safe load tables, installation methods and other pertinent information. Floor armoring is included. Illustrated with equipment and applicational photographs. — **DRAYO CORPORATION**, Machinery Division, Neville Island, Pittsburgh 35, Pa.

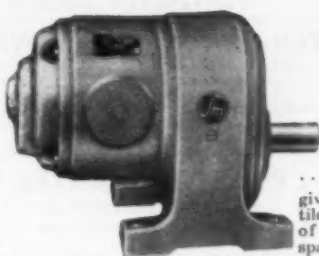
B-28 AIR FILTER — Bulletin 1150, 2 pages — Illustrates and describes the "Aridifier," designed to clean and dry compressed air, and which the manufacturer states will remove 96 per cent of oil, water and dirt from gas and air lines. Cross-section drawing explains operation. — **LOGAN ENGINEERING CO.**, 4901 W. Lawrence Ave., Chicago 36, Ill.

B-29 FLOOR MAINTENANCE — Bulletin L-3734, 2 pages — Describes Pak-Tamp floor resurfacing and repair method, by which factory floors can be resurfaced without interruption of plant or plant traffic, as the material can be applied as soon as the floor is laid and sets by compression. — **PARAMOUNT INDUSTRIAL PRODUCTS CO.**, University Center Station, Cleveland 8, Ohio.

B-30 SPEED CONTROL — Bulletin No. G-569, 12 pages — Describes basic operating principle of the company's variable speed drives and contains representative rating tables and dimension drawings. Three basic units included are variable speed transmission; Vari-Speed Motordrive, Vari-Speed motor pulley. — **REEVES PULLEY COMPANY**, Columbus, Ind.

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B-31 STEAM GENERATORS—Bulletin SD-31-10M 12-58, 4 pages—Describes packaged steam generator. Large photograph with explanatory captions explains construction of water column, windbox, panel board, burner, piping and wiring. —ERIE CITY IRON WORKS, Erie, Pa.

B-32 GASKETS—General Catalog, 42 pages—First section covers spiral wound gaskets and complete line of metal, metal-asbestos and cut gaskets from any material to standard sizes and specifications. Second section discusses Teflon. Illustrated with photographs and line drawings. —UNITED STATES GASKET COMPANY, 602 North 10th St., Camden, N. J.

B-33 MILL MOTORS—Booklet B-4738, 20 pages—Describes mill motors and d-c magnetic mill auxiliary controllers. Includes design features, construction details, armatures, bearings, field coils, brushholders, and ventilation. —WESTINGHOUSE ELECTRIC CORPORATION, Box 2099, Pittsburgh 26, Pa.

B-34 SYNCHRONOUS GENERATORS—Bulletin GEA-5470, 4 pages—Covers generators for standby, portable, and prime-source power in ratings from 1.875 to 50 kva with frequencies of 60 and 400 cycles. Four designs are described: externally-regulated, self-regulated, packaged-regulated 4-pole synchronous generators, and high-frequency 14-pole synchronous generators. —GENERAL ELECTRIC COMPANY, Apparatus Dept., Schenectady 5, N. Y.

B-35 DIESEL ENGINES—Catalog—Describes line of 2-cycle diesel engines for application in the industrial, petroleum, and marine fields. Covers single and multiple engine units from 2 to 24 cylinders with power ranging from 32 continuous to 750 intermittent horsepower. —DETROIT DIESEL ENGINE DIVISION, Adv. Dept., 18402 West Outer Drive, Detroit 28, Mich.

B-36 INDUSTRIAL METERS—Bulletin, 8 pages—Covers Tong Test Ammeters for measuring current in both a-c and d-c lines. Operation, construction, and

application are described. Price schedule is included. Illustrated.—COLUMBIA ELECTRIC MFG. CO., 4519 Hamilton Ave., N.E., Cleveland 14, Ohio.

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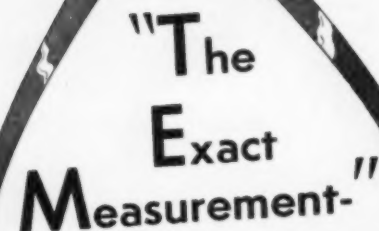
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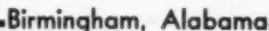
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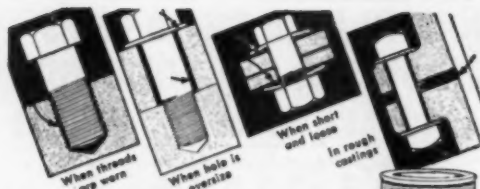


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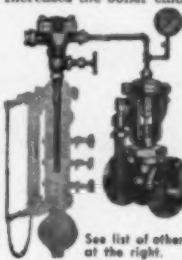
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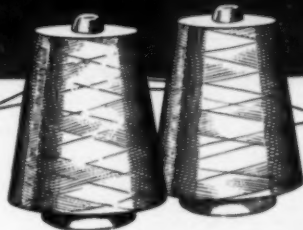


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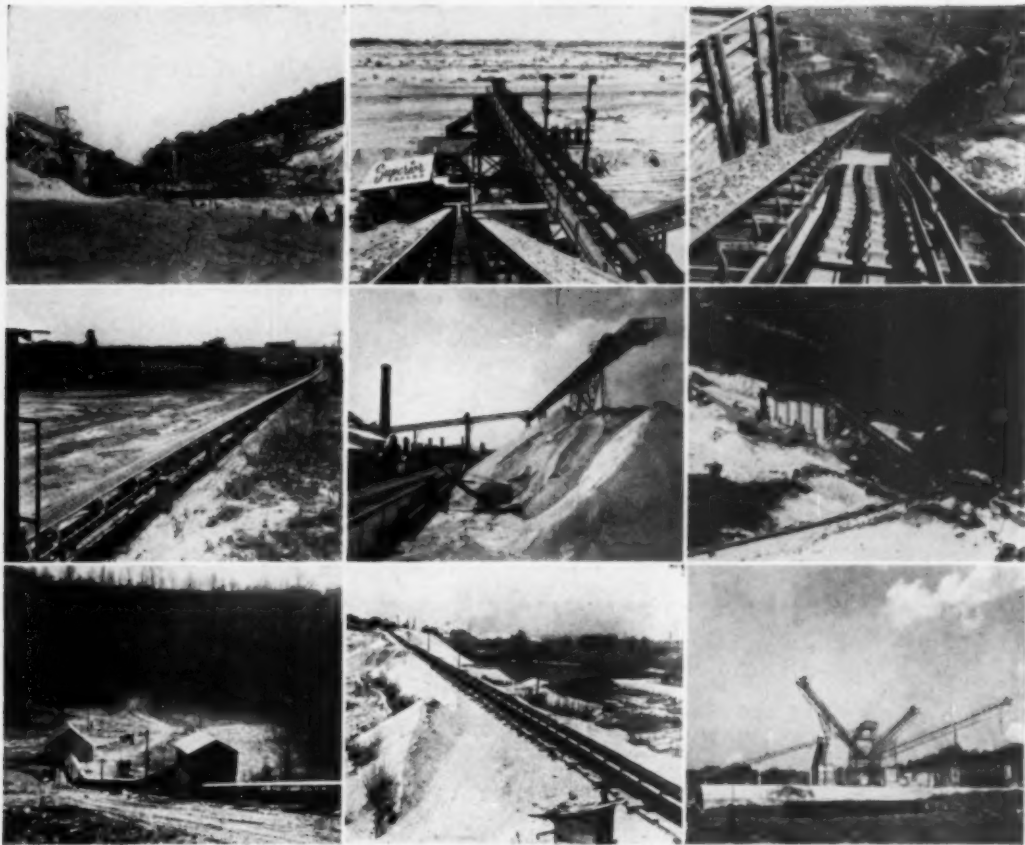
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Parts SiO_2 removed per part MgO	0.6	1.1
Average retention time of $\text{Mg}(\text{OH})_2$ in hours	4.7	100
Contact time of water with $\text{Mg}(\text{OH})_2$ in minutes	92	87
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